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THE URJA WATCH

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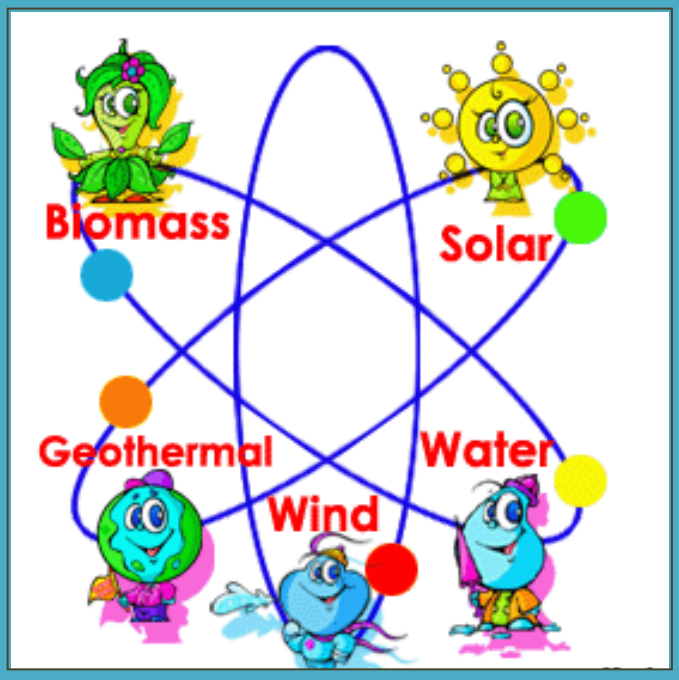
It is about "Conscience Keeping on Energy Matters"

Special Republic Day Issue
on
RENEWABLE ENERGY



The Urja Watch January 2009 Vol. II/Issue 7

Special Independence Day Issue on Renewable Energy

What's inside…

From the Editor's Desk...

Powering Progress Through Renewable Energy

Dear Readers,

Let me begin wishing you all a Happy New Year!

After completing a successful run of six months in 2008, "The Urja Watch" steps into the new year with a special issue focusing on Renewable Energy.

In our earlier issues, we talked about using the available energy more efficiently. It was just one way of addressing the energy shortage. The other way to get out of the energy fix is to widen the energy mix.

Out of the total installed power capacity of over 140,000 MW in the country, roughly two-thirds is contributed by thermal power and a quarter by hydro-power. Renewable energy contributes less than 8% and the balance by nuclear power.

Renewable energy makes use of nature's cycles and systems - such as wind, sunlight, biomass, geothermal heat – to harness natural energy. To expand power supply through renewable energy sources, the Ministry of New and Renewable Energy (MNRE) has drawn up an ambitious plan of adding about 14,500 MW during the current plan period. With the proposed addition, the share of renewable energy is expected to cross the 10% mark of the total installed power capacity by the year 2010.

In recent years, the renewable energy industry has transformed itself into a sophisticated field offering a range of technologies. While traditional businesses struggled to grow, many companies in the fledgling renewable energy industry recorded a boom in sales. In this issue, we have published an interview with a Bangalore-based dynamic entrepreneur who seized a significant share of solar energy business in a short time.

The primary barriers to using renewable energy in greater measure are cost and convenience. While costs continue to decrease, technologies are increasingly more efficient and user-friendly. For example, solar power is generally viewed as uneconomic. However, since the year 2000, the solar energy industry has witnessed remarkable growth globally. Over the last four years, global private-sector investment in solar energy has increased almost twenty-fold and new solar technologies are competing fiercely for cost leadership.

Sun and Wind

The potential for renewable energy is huge, particularly from the Sun and Wind. Not many countries are blessed by the Sun God as much as India. On a rough estimate, the country receives solar energy at an equivalent of over five trillion MWh a year – a quantity more than adequate to meet the country's total energy needs!

Take wind power. India's wind power potential was assessed at 45,000 MW in 1996 by C-WET, a wind energy technology institution. Over 9,000 MW of wind power capacity has been installed in the country so far and wind energy continues to be the dominant source of renewable power.

Biomass

At the beginning of 2007, India's biomass power scene achieved a milestone when total capacity crossed the 1,000 MW mark. Much of the energy from biomass is yet untapped as India's total potential from biomass power projects is estimated at a whopping 22,000 MW inclusive of bagasse-based cogeneration projects.

Efforts are ongoing to tap energy from biomass. During the ongoing 11th Plan period (2007-12), an additional 1,700 MW biomass-based power capacity is expected to be created.

Micro-hydel

As far as micro-hydel projects are concerned, the potential in the country is estimated at around 15,000 MW. As of now, over 4,000 potential sites have been identified aggregating to a capacity of 10,000 MW. Micro-hydel projects are normally installed under river run-offs, particularly in hilly terrains where the water-head is used for generation of electricity. Most of such hydel projects are stand-alone entities producing clean power.

Power generation from renewable energy sources contributes a great deal to building a sustainable India. Besides providing additional power, renewable energy projects offer many spin-off benefits. They can help create millions of jobs, revitalize the manufacturing sector, and foster new technologies. Above all, they hold the potential to mitigate the threat of climate change through reduction of greenhouse gas emissions, create carbon credits, and prolong the world's limited fossil fuel supply.

Energetically,

S.Subramanian
Editor

Letters to the Editor

Sir,

My congrats to the URJA WATCH Editorial team who have been consistently putting up a good show even in the face of indifferent attitude of larger section of the Iaemp group. Even I have never taken the initiative to write an appreciatory letter to the team though I was happy with the issues after issues.

Dear friends and Subi Sir, KEEP UP THE GOOD JOB!

Sunil Kumar Biswal, Sunabeda

Sir,

Please accept my hearty congrats for the titanic efforts by your team in publishing some of the finest articles in Urja Watch and making it a new letter of immense technical, social, legal and cultural values.

I request you to keep up the fervour and continue producing such enlightening articles. This is one of the ways in making people aware about the stark situation that exists on the energy front.

Thanks once again.

Fakhari Kanpurwala, Ahmedabad

An announcement

It has been decided to hold the 4th AGM of our association at Bhopal on 1st March'09. Same day also happens to be the 7th Foundation Day of BEE. On this occasion a new committee will take over. The detailed agenda will be posted later. It is also proposed to organise a Business Meet on the same day later in the evening.

Any agenda points or suggestions are welcome. Non-IAEMP members of yahoo group are requested to join IAEMP by 1st Feb'09 in order to avail several benefits to be announced in the AGM.

Sunil Sood
President, IAEMP, Bangalore

SOLAR ENERGY IN FOOD-PROCESSING INDUSTRY

By Prof. Ajay Chandak, Prof. Sham Patil, and Dr. S.K. Somani

Editor's Note: This article is based on a paper presented by the authors at an international conference in Spain. It describes the application and results of solar energy projects for the food processing industry.

ABSTRACT

Application of solar energy in food processing industry is mainly limited to drying operations. Solar vegetable-fruit dryers, operating below 55 degree centigrade, are used for the purpose. In recent years many solar gadgets have been developed for variety of applications. Different solar concentrators can provide excellent boiling, steaming, blanching and roasting capabilities while solar air dryers/heaters can effectively remove moisture. Efforts are required to integrate knowledge of food processing with capabilities of available solar thermal gadgets. Field trials on a variety of solar gadgets like 'Parabolic Concentrators', box ovens and solar dehydrators show not only huge fuel savings but also great value addition because of better quality of produce in terms of colour, aroma and taste. Because of excellent consistent quality, materials processed on these units can enjoy great market potential, in-house and for exports as well. Extremely low capital investment in this technology makes it financially viable.

1. INTRODUCTION

Farmers in India have normally very small land holdings and most of them are not well educated. These farmers have to face the brunt of market uncertainties. Because of poor market rates for the produce many farmers have committed suicide in recent years because of high debt. As most of the farm produce is perishable, there is nothing a farmer can do if rates in the market fall. Processing of perishable farm produce to a processed food can be a very good alternative for such farmers, whereby shelf life of the product is increased. Farmers can earn extra money for value addition to the product. Solar dehydration is traditionally practiced for a few varieties of farm produce and fish. Development of new solar gadgets, like solar concentrators and ovens, open up many avenues for food processing. For small farmers, forming cooperative societies for food processing can be an excellent alternative.

2. BACKGROUND

Open sun drying is traditionally practiced for many vegetables, fruits and fishes. Dehydrated foodstuff has a higher shelf life, making it available throughout the year. The dehydrated fruits and vegetables have much smaller weight and hence are easy to transport. They cater to the needs of defence establishments, adventure expeditions, mountaineering, etc. These dehydrated products can be used in various preparations even in off-season. Drying vegetables, fruits and fishes by traditional open air sun drying is time consuming and less hygienic. In industrialised regions and sectors, mechanised dryers, with fans have now largely replaced open air-drying. Mechanised drying is faster than open-air drying and it uses much less land. But the equipment is expensive and requires higher energy cost with fuel or electricity to operate. With oil costs around $50 and electricity very uncertain in rural areas, a solar dryer is a good alternate option available in the market. Higher capital investment and lack of confidence in the technology are the main hurdles in popularizing this beautiful gadget. Applications of solar dryers are known to many. In recent years many solar gadgets have been developed for a variety of applications. Different solar concentrators and box ovens can provide excellent boiling, steaming, blanching and roasting capabilities while solar air dryers/heaters do the work of moisture removal. Combinations of such solar gadgets can take care of major energy needs in food processing industry. In spite of such developments, application of solar energy in food-processing industries has not picked up. There exists a big communication gap between solar researchers and food technologists. Food technologists are not aware of capabilities of new breeds of solar gadgets like solar concentrators, ovens and dryers, while solar technologists are unaware of technical requirements of different processes followed in food processing. These gadgets have capabilities of bringing in revolutionary change in food processing technology. Apart from huge energy savings, in most of the cases there was big improvement in the quality of product with great value addition.

3. THIS PROJECT

At the project center, there are installations of a variety of renewable energy gadgets. Trials are conducted using these solar gadgets for different food processing applications as per requirement of the clients. Experiences of such trials using different solar gadgets are described:

3.1 **Solar Concentrators**: A parabolic dish concentrator of 2.3 m dia. was developed by the author[1] and Scheffler concentrators are being successfully used for variety of applications.

i. One parabolic dish concentrator of 2.3 m was successfully tried and tested at 'Ashtang Pharmacy' Dhule, where Indian traditional ayurvedic medicines are manufactured. This concentrator was used for boiling herbs and preparation of syrups (kadhas). Renowned ayurvedic doctor Mr. P.T. Joshi maintained separate records for the patients who were treated with medicines prepared on cooking gas and on solar concentrators. He reported that potency of the medicines prepared on the solar gadget is much higher than those prepared on cooking gas. His investment in a solar concentrator, costing Rs. 12000/- ($ 250), was paid back in less than 6 months. The solar dish concentrator has been in use for last four years.

This is the photograph of the 2.3 metre dia. parabolic dish solar concentrator that has been in use for over four years in the preparation of Ayurvedic syrups.

Standing beside the solar Dish is Dr. P.T. Joshi

After successful application of solar concentrators, Dr. P.T. Joshi has now started using other solar gadgets like solar water heaters, solar dryers etc. He kept separate batches of syrups with solar processing and those processed on LPG stoves and maintained record of patients. He noticed that potency of solar processed medicines is much higher and recovery of patients was much faster.

At Chandak Farm, a similar 2.3 metre diameter solar concentrator is used. Following applications were tried on this concentrator successfully with huge fuel saving and better quality of product.

- For boiling Amla (Indian Gooseberry) for different applications like Amla candy, Amla pickles etc. This results in huge fuel savings and better quality produce.
- For preparing hair oil from Amla and Aloe Vera.
- Roasting of cashew nuts was carried on a small scale for viability studies. The trials were successful and the concentrator can be a good substitution for conventional drum roasting and plate roasting processes, where firewood is used.

These parabolic concentrators are a good heat source for boiling and roasting applications, requiring temperatures less than 200^{0}C. One 2.3 m dia. concentrator works as a 1.5 kW heat source. For higher commercial requirements demanding medium temperatures, Scheffler concentrators of 12 and 16 sqm. are more suited.

3.2 **Solar Concentrator for baking and roasting applications:** A new industrial concentrator developed is capable of delivering hot air up to 200 degree centigrade. This concentrator is suited for oven-like applications for baking & roasting in high temperature ovens.

Photograph shows industrial Solar Concentrator for hot air. with the inventor Ajay Chandak

For bakery applications, one concentrator of 10 sq.metres could bake 180 loaves of 200 gms each in a March day.

Quality of bread was excellent With uniform puffiness and Colour.

3.3 **Solar Dryers**: Solar dryers are normally designed for use below 55^o C, assisted with airflow. The author[1] has designed a simplified, low cost version of solar dryer, which is affordable at rural levels.

Salient features of solar dryers include the following:

- The arrangement has a loading cabinet on a rooftop, while collector panels are laid on the south side towards the ground. As the cabinet is placed at higher elevation than the collector panels, natural draught assists the induced draught created by fan or turbo-ventilator as the case may be. Because of combined draught overall auxiliary power consumption for the fan is reduced.

- In case of power cuts natural draught maintains airflow and overall temperatures are maintained slightly above the set temperatures. This provision avoids overheating and spoilage of the material in the cabinet.

- Solar collectors were constructed in powder-coated mild steel sheets instead of aluminium sheets. This reduced the cost of solar collector panels by around 50%. Outer shell of the panel is constructed from a single sheet without any joints, which takes care of the possibility of hot air leakages.

The picture on the left shows a typical low cost solar dryer for agro processing.

It includes a loading cabinet made of glass on three Sides and a plywood door on the rear side.

Use of glass permits trapping additional solar energy. Also, it enables the operator to see the material being loaded. It offers a better control and avoids over-drying.

The design of the cabinet permits uniform distribution of hot air, thereby causing uniform drying rates.

The design is simple, low cost and permits local fabrication.

This design is further improved with the provision of turbo-ventilators for generating draught.

Trials on solar dryers proved successful for following agro products:

- Amla Candy was dried in these dryers. Commercial production has continued for the last two years.
- Green chilli, moringa leaves, asparagus, Aloe Vera, ladyfingers, tomato, onions and gourds for dehydrated products.
- In cashew nut, kernel is covered with testa. These kernels were successfully dried in solar dryers, which facilitate easy peeling off of testa.

3.4 **Solar Box Ovens**: Solar box ovens were tried for roasting and baking applications successfully. Some of these developments include:

- Roasting of 'Soyabean' for baby food.
- Roasting of 'Cashew Nut'.
- Roasting of ground-nut.
- Baking breads and cakes.

4. TRIALS AND RESULTS

Prior to use of solar gadgets, for manufacturing 'Amla Candy', Amla used to be boiled using conventional fossil fuels and then final produce dried in open sun. Colour of 'Amla Candy' used to be brown-black and maintaining moisture level of around 20% was difficult. Hence quality of the produce was not consistent. Same product on solar dryer gave excellent green-yellow colour with much natural and fresh looks.

Picture alongside shows Amla Candy processed by 'Open Sun Drying' (right) and on 'Solar Dryers' (left).

Trials on green chilly, moringa leaves, asparagus, Aloe Vera, ladies finger & gourd showed excellent colour retention. The dehydrated produce meets higher quality norms in terms of colour, aroma and taste.

5. CONCLUSION

For promoting solar energy application on a large scale in the food processing industry, it is very important to integrate knowledge of food processing with capabilities of different solar gadgets. Application of existing solar gadgets and developing new designs of solar gadgets based on case-to-case basis are keys for adoption of this beautiful technology by the food processing industry. Great quality improvement in solar processed food was observed in terms of retention of color, aroma and taste. Solar processed products could fetch much higher prices in the market because of better quality of the product.

About the authors...

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Meet a Resilient Renewable Energy Leader ...

Editor's Note: There are many entrepreneurs who foresaw and pursued the fast-growing business opportunity in Renewable Energy products and services. Not all of them succeeded in this challenging business. Only those with grit, strong determination and resilience to withstand setbacks eventually stayed in the race for leadership. One such resilient renewable energy leader is Mr. D.V.Manjunath, Managing Director, Emmvee Solar Systems Pvt. Ltd. IAEMP's President Mr. Sunil Sood recently interviewed Mr. Manjunath at his office in Bangalore. We are providing excerpts from the interview.

IAEMP's Mr. Sunil Sood (right) with Mr. D.V. Manjunath (left)

Sood: Mr. Manjunath, It is nice meeting with you. Please tell me briefly about your background, how you thought of venturing into solar energy business.

Manjunath: I am a graduate in commerce from St. Joseph's College, Bangalore. Realising the need to reduce dependency on conventional energy sources that are fast depleting, I wanted to explore renewable energy. After study and research in this area, I saw the tremendous scope, business opportunities and benefits that solar energy offered to society. So, in September 1992, I started the manufacture of solar water heating systems with only 10 workers.

Sood: What were the initial responses that your company received?

Manjunath: The initial response was not lucrative. Over a period of time the response picked up. From a modest turnover of Rs.69.53 Lakhs in 1992, the company has achieved a turnover exceeding Rs.200 Crores in 2008.

Sood: Over the years, what factors have contributed to make "EmmVee" a grand success?

Manjunath: Over the years, we adopted various marketing techniques that include advertisements in newspapers, radio, TV, sponsoring social and cultural events. We took the responsibility in propagating the message - "Protect the Environment and Save Conventional Energy Sources." My company began operating soft loan schemes to ensure that the solar water heaters and other products manufactured by it reach the maximum number of users. To avail the benefits of economy, the scale of operation was upgraded to cater to the ever-increasing demand for the products.

In August 2001, our manufacturing facility was shifted from Ganganager to Sonnappanahalli, in Bettahalsur, Bangalore North, Karnataka. The production capacity was enhanced from 2000 Litres Per Day (LPD) to 8000 LPD per day. The total installed capacity of the manufacturing unit is now enhanced to 80, 00,000 LPD per annum.

Sood: You started when the subsidy on solar water heater was still there. Was removal of capital subsidy and introduction of interest subsidy better for solar water heaters?

Manjunath: Removal of capital subsidy and introduction of interest subsidy has helped in the growth of solar water heaters

Sood: Would it be better if the government announces direct rebate on purchase of solar water heaters by way of deduction from the taxable income?

Manjunath: Yes; I think it is better to give a direct rebate.

Sood: What are your future plans? Any plans to develop solar thermal air-conditioning systems?

Manjunath: We have a Joint Venture with Solar CAP AS, Denmark.

Our new manufacturing facility located over 21 acres of land in Dobospet (around 45 KM from Bangalore) is under progress. We would soon be providing world class solar water heaters to our customers at very competitive and affordable prices.

Sood: Please tell me something about the achievements and recognitions you have received from government agencies and professional bodies.

Manjunath: In appreciation for my achievements in the field, The Solar Energy Society of India conferred the "Young Entrepreneur" award to me in 2002.

In 2007, the Ministry of New and Renewable Energy (MNRE), Government of India awarded to my company the second prize for Solar Water Heater Manufacturers (2002-07).

The Solar Energy Society of India (Indian section of the International Solar Energy Society) awarded the Business Leadership Award in 2008

Sood: How far the mandatory provision for solar water heaters has been effective?

Manjunath: It is not much effective presently as it is not enforced effectively by the Government. Once effective enforcement takes place it would be advantageous.

Sood: What are your plans to develop dealers and distribution network?

Manjunath: Presently, we are strong in Karnataka. We have a dealer and distributor network in Andhra, Maharashtra, Madhya Pradesh and Delhi.

Sood: What is the present market of solar water heaters? How do you foresee the potential for growth?

Manjunath: "Sun Wind Energy" magazine provides more information on the market for solar water heaters. You may access it through the following link:

http://www.sunwindenergy.com/swe/downloads/solar_thermal_worldmap.pdf

In India, we stand at the top place. In the world, we stand 20th along with our JV partners. I estimate growth to be in the range of 20 – 30% per annum.

Sood: Are you exporting your products?

Manjunath: Yes; we are exporting our products

Sood: Please tell me about other activities related to your company EMMVEE.

In addition to Emmvee Solar Systems Pvt. Ltd. that produces "Solarizer" brand solar water heaters, we have two more companies under EMMVEE group.

One is Emmvee Toughened Glass & Photovoltaics Pvt. Ltd. This company produces a range of products such as: Toughened Glass for various applications in sizes ranging from 3mm to 19mm, monocrystalline and polycrystalline Solar Photovoltaic (SPV) modules for grid–connected applications, and Building Integrated Photovoltaic (BIPV) modules for off-grid applications**.**

The second affiliated company is Emmvee Solar Lightings. This company offers Solar Lanterns, Garden Lighting Systems, Street Lighting Systems, and Home Lighting Systems AC & DC Systems.

Sood: Thank you Mr. Manjunath for your time and the valuable information that you provided.

What needs to be done to change mindsets?

It should be our endeavor to effect a shift in the minds from:-

"Qualification"–to–"Education";
"What I can get" –to–"What I can give";
"Self-centered success"–to–"Selfless accomplishments";
"Teaching and studying"–to–"Learning and realization";
"Indifference and inaction" –to–"Bold initiative & decisive action";
"External Casualness & mediocre approaches" –to–"An indomitable urge to excel";
"Employment as mere job & salary"–to–"A great opportunity to unfold and express oneself";
"Forced upgradation of quality" –to–"An unflinching mission to serve by offering the best";
"Competitive rivalry" –to–"Support & collaboration for competitiveness";
"Reward – induced limited motivation" –to–"Limitless self – motivation";
"Excuses & escapism" –to–"Accountability & Taking charge";
"Policed discipline"–to–"Principle-bound self discipline";
"Service & Means on life" –to–"Serving and Meaning to life";
"Knowing and doing" –to–"Performing and achieving";
"Mere living" –to–"living by leaving a legacy",
and
"I can't" –to–"I can"

Renewables Offer Improved Livelihood

By S. Subramanian

Since olden days, the sun and wind have been used as natural resources of power, but in recent years they are charting new territories with revolutionary wind turbines and solar energy conversion panels.

Serving as the Program Director for the 'State Environmental Initiative' program at the US Council of State Governments, the author had the privilege of facilitating many energy and environmental projects across six Asian countries (including India) through grants funded by the US Agency for International Development (USAID). Some of these projects involved tapping the sun and wind power to improve livelihood in remote areas. In this article, the author shares some interesting information on the projects in Sri Lanka and the Philippines.

Wind Blows Change in Sri Lanka's Village

A wind power project was implemented during 2004 in a remote island called Bathalagunduwa, about 10km off the West Coast of Sri Lanka. This island is small - just about 4km long and less than 1 km wide, with a population of about 3000 fisher families. They live in difficult conditions with little fresh water, no health facilities and no grid power supply. The local facilities include one school, a church, a mosque, and a small store. Livelihood for the people came primarily from fishing activity.

Winds in the island average over 6 metres/sec for most of the year. The project utilized the wind power to generate electricity. The local people helped in the tower erection and installation of the distribution system.

The installed system includes two 1KW wind units with storage in 24V, 450Ah Exide batteries, converted by India-made 1.5kW sine inverters. Power is distributed through overhead lines to a mini-grid of 16 families, a church, a store and a VCR movie theatre. A diesel generator is provided as a back-up power supply.

The power system is maintained by a local manager, who is responsible for revenue collections from those receiving power, and allocating these funds to managing and maintaining the system.

The people of this remote area enjoy the benefits of this clean energy derived from wind. In the evenings, fishermen enjoy the blaring "Bollywood" music sitting outside the open air movie house.

Wind has blown a big change in the lives of the fishermen. To provide cool drinks and store medicines, their wish-list now includes a "wind powered refrigerator!"

Renewable Energy and Livelihood Project in the Philippines

Many small fishing villages lack electricity. They waste their catch because there are no refrigeration facilities. A renewable energy generator was seen as an alternative for communities burdened with the high cost of operating fuel-fed generators or with the transportation of ice blocks from the city.

A pilot renewable energy project was built on the island of Palawan in the Philippines, using easily replicable small wind turbines and solar panels to power a mini ice plant. The island's fishing villages have no reliable sources of electricity. The small renewable energy system is also designed to serve as a battery recharging station, which allows villagers to extract a fee to charge batteries in the boats used by tourists, thus improving their livelihood.

The technology holds a great promise to bolster local livelihood development and poverty reduction.

Photo shows the author (right) with Dr. Prabhu Dayal (left), director of the renewable energy project in the Philippines.

In the background is the sleek wind turbine and some of the associated equipment.

Potable Water Through Solar Powered Device

In the Ratnapura district of Sri Lanka, safe drinking water is scarce in some of the remote areas. The good news is that they have plenty of sunlight. An innovative project demonstrated that the solar power could be effectively used to provide potable water.

The project installed a patented solar-powered pump (see picture alongside) fitted with solar panels which operated under varying light intensities. At night or in cloudy days, the device could be manually operated simply by foot pedalling.

The device lifts water from boreholes using a unique reciprocating piston pump. Water is first pumped through a filter. An optional control valve then directs the water into a non-corrosive pressure tank, and then to an elevated tank. A chemical feeder incorporated in the system disinfects the water through an automatic chlorinator and filter.

In return for the potable water, the local community share the tasks of maintaining the system.

The concept is replicable in many remote areas of India too!

About the author

A seasoned management professional with an array of global experiences Sundaresan Subramanian ("Subi") helped build bridges of technical and business cooperation between Asia and the USA. His contribution to the energy and environmental field is recognized through international awards. He serves as the editor of "The Urja Watch" and may be reached at tellsubi@gmail.com

Rural Energy Self Sufficiency

By T. Jayaraman

India is a country with a predominantly rural population. Most of the villages in the country have only rudimentary facilities. The attempts to provide electricity to the villages through conventional grid transmission has been ineffective due to the following reasons:

1. The cost of taking electricity to the villages has been very high given the wide variation in demand, distances, and the consequent transmission losses.
2. The village economy cannot afford the present cost of electricity and thus the cost needs to be subsidised by the governments.
3. The electricity production in India is far short of demand, and even the high paying customers do not get sufficient electricity.
4. Due to lack of electricity, the other basic facilities are unavailable in the villages – consequently the qualified manpower in the village declines, curtailing the progress of the village even further.

Distributed Generation

The distributed generation of electric power is one of the essentials to reduce the transmission losses. But the distributed generation alone cannot solve the energy and employment problems of the rural areas, unless the technology ensures that the economy of scale does not alter the costs. Thus one has to think of a more economic solution. Due to the agrarian nature of Indian economy, the biomass availability is estimated by many sources to be equivalent of more than 100,000 MW. Even if one considers the biomass free, the cost of producing electricity with conventional approach would not be very much lower, when compared with fossil fuels.

Demand Side Management

One of the biggest problems of the small generation is the variation in demand and the demand side management. Thus, it would be essential to understand the requirements and plan an acceptable schedule of using the electricity, to create a near flat demand pattern. One possibility would be to use low technology battery driven vehicles, to be introduced for short distance travel and for field usage. These batteries can be charged, during the low demand periods. But the flattening of the demand alone cannot ensure economy of generation.

Biomass Based Generation

With such large biomass potential, and given the shortage, the implemented biomass based energy systems are very less (about 5000 MW) - the main reason being that these still need to be subsidised due to high initial costs. They also suffer from either being too high a technology requiring very high skills, or with very low efficiency.

Any of the presently known methods to produce electricity alone has thermal efficiency ranging from 25 to 35%. But with combined heat and power, the thermal efficiency can be improved to as high as 85%.

Combined Heat And Power And Trigeneration

Combined heat and power, has been left as a secondary choice in India, as community heat requirement is considered to be negligible in a tropical country. But, considering that almost any agro processing requires heat, it would be essential to plan agro processing to take care of the heat from generators. In addition, it has been recognised that Indian agriculture suffers from improper storage facilities, and this reduces the cost realisation of their products by as much as 50% in some cases. Today, silica gel based adsorption technology, which requires very little maintenance and free of pollutants is available for such application, with some innovative modifications.

Integrated Power, Employment And Economy Improvement

Thus, an integrated heat, power and cooling with planned demand, using the available biomass would bring the urban facilities to rural areas and simultaneously improve the economy. Though such a solution is to be tailor made for each village cluster, it is expected that various requirements can be modularised, and the variants of each module can be within a reasonable number. With five modules of biomass usage, power production, heat usage, cold storage and demand management, the variants available for different villages would be sufficient to cover majority of the villages.

The Way Forward

Prototypes:

Establish Regional Rural Energy Efficiency Centres (REEC) centres with a working prototype of each identified and accepted technology. Establish developmental (not research) facility for monitoring and improvement of these prototypes.

Objectives of REEC

A. Short Term (1-2 years) Objectives

- Identify educational institutions for providing space, facilities and possibly manpower for locating the REEC(s)
- Install models of different gasification/biomethanation energy generation equipment for continuous operation in the institution.
- Find methodologies for student projects in detailed study/ monitoring/ improvement of these equipment (s)
- Identify, design/procure/prototype chilling/cooling equipments based on low grade heat
- Procure /design /prototype short range battery operated vehicles for agricultural purposes/ local transportation
- Conduct conferences/ seminars/ other dissemination exercises to increase the awareness and to collect information on possible impediments
- Establish a network of manufacturers of equipment/control system providers/academic institutions for continuous interaction and improvement.

B. Long Term (3-5 years) Objectives

- Have commercial and bankable models for different regions/ crop patterns/ village sizes
- Establish about 100 collages with self sufficient power generation with experimentation capability for the region
- Have minimum 10 villages as model rural energy self sufficient villages
- Motivate at least one Indian manufacturer with design capability to consider micro turbine
- Have commercial model for Adsorption air-conditioning, liquid desiccant based cooling system for licensing/showcasing.
- Have commercial models for Short range battery operated vehicles
- Have automatic battery charging equipment based on plant load
- Develop “low cost” performance optimisation package
- Develop concept of central kitchen for bulk cooked items
- Develop gas distribution/heat distribution models depending on the climate/location
- Develop solutions for entrepreneurship failures, to ensure smooth take over for continuous operation.
- Develop financial models for “pricing” the energy supply/services.

Spread

Select a premier technological institution in each zone (reputed engineering institution in rural area) as a nodal centre. This should have at least one working prototype of each technology such as biomass gasification, biomass methanisation, heat recovery, and demand management system model. These must be operated partially by the students themselves, to enable them get a hands on training – in addition, a group of research students should work on each of the prototypes for improving the performance and/or solving a real life problem on a continual basis. These institutions also become the nodal centres for establishing and providing technical aid for entrepreneurs wanting to establish the generation facilities, based on the experience of a demonstration unit, funded by grants from the state. These can be termed as primary rural energy centres.

Select one technological institutions as secondary rural energy centres (engineering colleges in rural areas) in each district and make them adopt a village with a typical combination of rural energy system. Operating these by selected students, who could be compensated for operating these facilities as part of the co-curriculum would train many of the students to get a "hands-on experience." These would become the source for trained personnel/rural entrepreneurs for spreading these over time.

Entrepreneur Development

The success of the distributed generation would depend on ensuring the availability of the skilled personnel to man the generation, distribution, run the rural enterprise, and earn sufficient income from the above. This can be achieved by ensuring that the scheme is economically viable, which would also have a prestige value attached to it.

By encouraging the engineering and polytechnic students to work hands on on the various modules of the rural energy generation during their studies, they would get the confidence for running the same efficiently. This, when coupled with the possible earning, nearly equivalent to those who get placed in the bigger industries, can attract many to stay back / or move to villages to run these enterprises. With a little bit of promotion and imagination, a whole new breed of rural entrepreneurs can be developed, who can then diversify into many other distributed manufacturing/services.

Economical protection

Protection mechanism in the form of guaranteed minimum revenue for the entrepreneurs, would be required, in case of default of one of the linked entrepreneurs. When one entrepreneur fails due to some reason, a mechanism should be evolved for speedy take over of the defaulting users.

The central expert advice, able technical support from select institutions, and establishing of economic viability, would ensure that failures are few and those who fail can be taken care as any other normal business.

Thus, this protection is a sound commercial venture, rather than an "inefficiency protection mechanism"

Financing

Like any pioneering schemes, such far reaching schemes require sufficient initial funding in three ways.

1. To establish a central expertise, with small developmental group consisting of technologists, financial analysts, engineering experts with a management team to follow various decentralised activities.

2. To get the selected engineering and technological institutions to set up their "self generation" and "energy management " project.

3. Initial funding, and also a "mentoring" fund for start ups, or seed capital for engineering firms to work on franchisee basis.

Summary

- Rural India has need for enormous energy.

- Rural India has potential to generate considerable energy to become self sufficient.

- It is recommended and is eminently possible to have these decentralised generation centres as combined heat and power, to achieve thermal efficiency of over 85%, and to make these projects economically viable.

- These can be done with technologies available as on date, but requires fine tuning.

- India has number of engineering collages to act as centres for dissemination of technology.

- A viable commercial model can be established due to high efficiency and low fuel cost.

- By making the whole project commercially viable, a franchisee /entrepreneur model can be worked out for widespread application.

- Funding is required only for setting up of centres, and initial demonstration units.

For more information on the technologies and the various combinations of technologies suitable for Indian villages, please refer to the prize winning paper of the author available at the following link:

http://www.energymanagertraining.com/announcements/issue25/winners_papers_Issue25/04_TJayaraman.pdf

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About the author:

T. Jayaraman (or TeeJay as he is better known) holds a B.Tech from IITM-Chennai. He is a specialist in energy conservation and has conducted numerous energy audits at a variety of facilities. Widely traveled abroad, he is the prime mover behind SECO group that pioneered many years ago in the manufacture of high temperature oxygen analysers. Several patents are in the pipeline for TeeJay.

Power From Earth's Heat – Geothermal Energy

by: F T Kanpurwala

WHAT DOES THE WORD "GEOTHERMAL" MEAN?

"Geothermal" comes from the Greek words *geo (earth) and therme (heat).* So, geothermal means heat of earth or earth's heat.

WHAT IS GEOTHERMAL ENERGY?

Our earth's interior - like the sun - provides heat energy from nature. This heat - geothermal energy - yields warmth and power that we can use without polluting the environment. Geothermal heat originates from Earth's fiery consolidation of dust and gas over 4 billion years ago. At earth's core - 4,000 miles deep - temperatures may reach over 5,000 degrees C.

HOW DOES GEOTHERMAL HEAT GET UP TO EARTH'S SURFACE?

The heat from the earth's core continuously flows outward. It transfers (conducts) to the surrounding layer of rock, the *mantle*. When temperatures and pressures become high enough, some mantle rock melts, becoming *magma.* Then, because it is lighter (less dense) than the surrounding rock, the *magma rises (convects), moving slowly up toward the earth's crust, carrying the heat from below.*

Sometimes the hot magma reaches all the way to the surface, where we know it as lava. But most often the magma remains below earth's crust, heating nearby rock and water (rainwater that has seeped deep into the earth) - sometimes as hot as *370 degrees C.* Some of this hot geothermal water travels back up through faults and cracks and reaches the earth's surface as *hot springs* or *geysers*, but most of it stays deep underground, trapped in cracks and porous rock. This natural collection of hot water is called a *geothermal reservoir.*

HOW HAVE PEOPLE USED GEOTHERMAL ENERGY IN THE PAST?

From earliest times, people have used geothermal water that flowed freely from the earth's surface as hot springs. The oldest and most common use was, of course, just relaxing in the comforting warm waters. But eventually, this "magic water" was used (and still is) in other creative ways. The Romans, for example, used geothermal water to treat eye and skin disease and, at Pompeii, to heat buildings. As early as 10,000 years ago, Native Americans used hot springs water for cooking and medicine.

For centuries the Maoris of New Zealand have cooked "geothermally," and, since the 1960s, France is using geothermal water to heat homes.

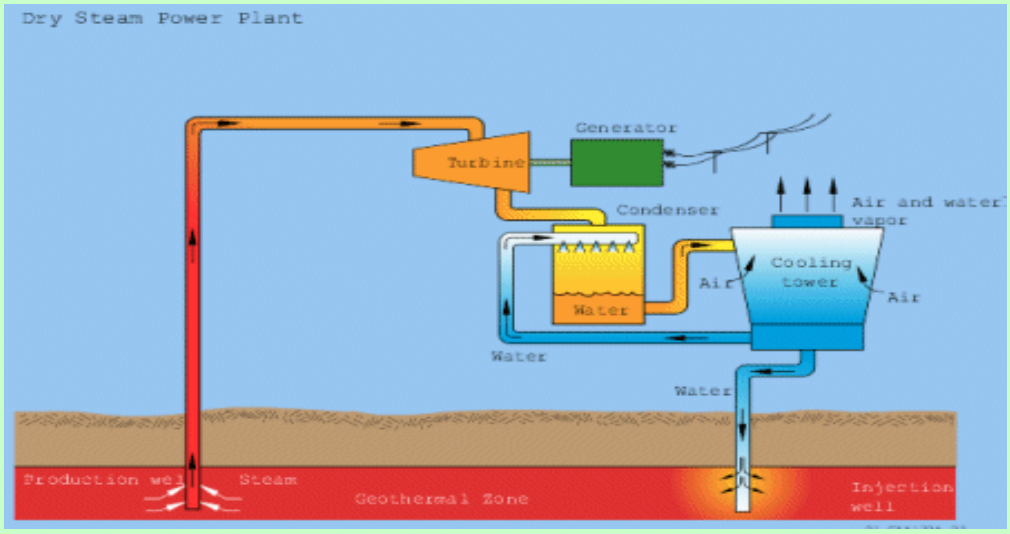
HOW DO WE USE GEOTHERMAL ENERGY TODAY?

Today we drill wells into the geothermal reservoirs to bring the hot water to the surface. Geologists, and engineers do a lot of exploring and testing to locate underground areas that contain this geothermal water, so we'll know where to drill geothermal production wells. Then, once the hot water and/or steam travels up the wells to the surface, they can be used to generate electricity in geothermal power plants or for energy saving non-electrical purposes.

HOW IS ELECTRICITY GENERATED USING GEOTHERMAL ENERGY?

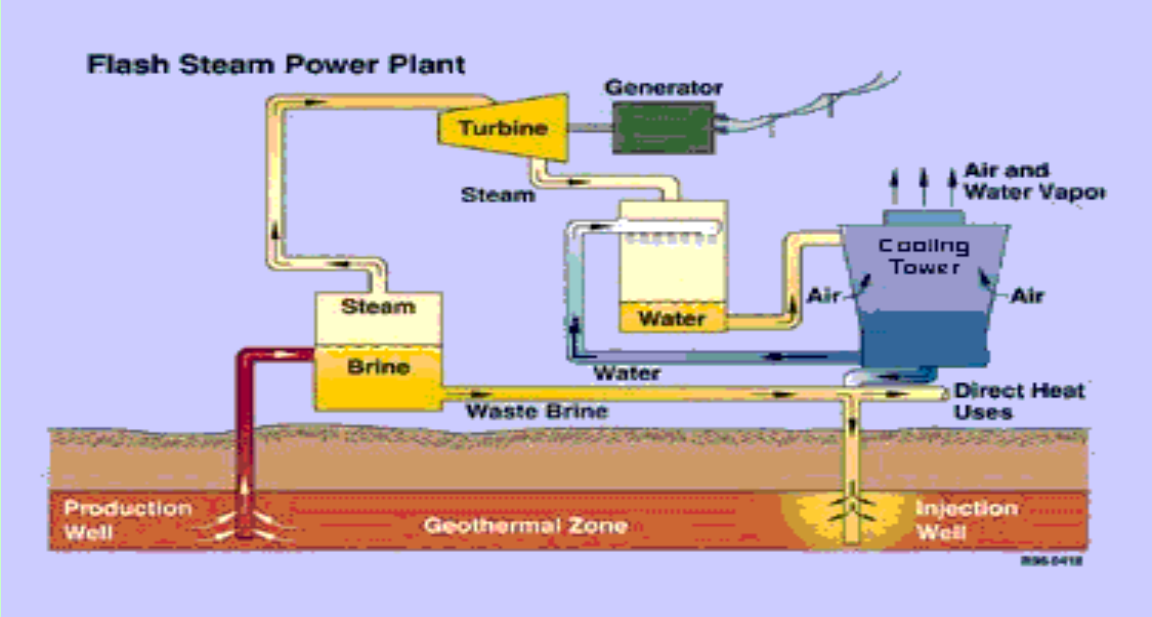
In geothermal power plants steam, heat or hot water from geothermal reservoirs provides the force that spins the turbine generators and produces electricity. The used geothermal water is then returned down an injection well into the reservoir to be reheated, to maintain pressure, and to sustain the reservoir. There are three kinds of geothermal power plants. The kind we build depends on the temperatures and pressures of a reservoir.

1. A "dry'" steam reservoir produces steam but very little water. The steam is piped directly into a "dry" steam power plant to provide the force to spin the turbine generator. The largest dry steam field in the world is The Geysers, about 90 miles north of San Francisco. Production of electricity started at The Geysers in 1960, at what has become a most successful alternative energy project.



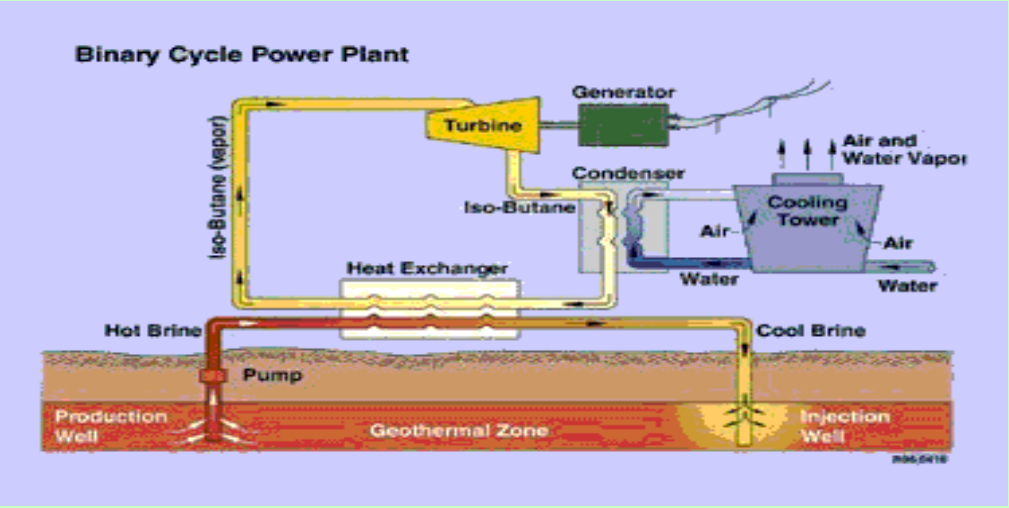
The schematic diagram of a Dry Steam Geothermal Power Plant

2. A geothermal reservoir that produces mostly hot water is called a "hot water reservoir" and is used in a "flash" power plant. Water ranging in temperature from 150 - 370 degrees C is brought up to the surface through the production well where, upon being released from the pressure of the deep reservoir, some of the water flashes into steam in a 'separator.' The steam then powers the turbines. The schematic diagram is shown below.



The CalEnergy NavyI flash geothermal power plant at the Coso geothermal field.

3. A reservoir with temperatures between 120 – 180 degrees C is not hot enough to flash enough steam but can still be used to produce electricity in a "binary" power plant. In a binary system the geothermal water is passed through a heat exchanger, where its heat is transferred into a second (binary) liquid, such as isopentane, that boils at a lower temperature than water. When heated, the binary liquid flashes to vapor, which, like steam, expands across and spins the turbine blades. The vapor is then recondensed to a liquid and is reused repeatedly. In this closed loop cycle, there are no emissions to the air. The schematic of the binary power plant is shown below.



The Mammoth Pacific binary geothermal power plants at the Casa Diablo geothermal field.

WHAT ARE SOME OF THE ADVANTAGES OF USING GEOTHERMAL ENERGY TO GENERATE ELECTRICITY?

- ***Clean.*** Geothermal power plants, like wind and solar power plants, do not have to burn fuels to manufacture steam to turn the turbines. Generating electricity with geothermal energy helps to conserve nonrenewable fossil fuels, and by decreasing the use of these fuels, we reduce emissions that harm our atmosphere. There is no smoky air around geothermal power plants -- in fact some are built in the middle of farm crops and forests. , and share land with cattle and local wildlife.

- ***Easy on the land.*** The land area required for geothermal power plants is smaller per megawatt than for almost every other type of power plant. Geothermal installations don't require damming of rivers or harvesting of forests -- and there are no mine shafts, tunnels, open pits, waste heaps or oil spills.

- ***Reliable.*** Geothermal power plants are designed to run 24 hours a day, all year. A geothermal power plant sits right on top of its fuel source. It is resistant to interruptions of power generation due to weather, natural disasters or political rifts that can interrupt transportation of fuels.

- ***Flexible.*** Geothermal power plants can have modular designs, with additional units installed in increments when needed to fit growing demand for electricity.

- ***Keeps Money at Home.*** Money does not have to be exported to import fuel for geothermal power plants. Geothermal "fuel'" - like the sun and the wind - is always where the power plant is; economic benefits remain in the region and there are no fuel price shocks.

- ***Helps Developing Countries Grow.*** Geothermal projects can offer all of the above benefits to help developing countries grow without pollution. And installations in remote locations can raise the standard of living and quality of life by bringing electricity to people far from "electrified" population centers.

HOW MUCH ELECTRICITY IS FROM GEOTHERMAL ENERGY?

Since the first geothermally - generated electricity in the world was produced at Larderello, Italy in 1904, the use of geothermal energy for electricity has grown worldwide to about 7,000 megawatts in twenty-one countries around the world.

The United States alone produces 2700 megawatts of electricity from geothermal energy, electricity comparable to burning sixty million barrels of oil each year.

WHAT ARE SOME NON-ELECTRIC WAYS WE CAN USE GEOTHERMAL ENERGY?

Geothermal water is used around the world, even when it is not hot enough to generate electricity. Anytime geothermal water or heat are used directly, less electricity is used. Using geothermal water 'directly' conserves energy and replaces the use of polluting energy resources with clean ones. The main non-electric ways, we use geothermal energy are DIRECT USES and GEOTHERMAL HEAT PUMPS.

DIRECT USES: Geothermal waters ranging from 10 degrees C to over 150 degrees C, are used directly from the earth:

- 'to soothe aching muscles in hot springs, and health spas (balneology);
- to help grow flowers, vegetables, and other crops in greenhouses while snow-drifts pile up outside (agriculture);
- to shorten the time needed for growing fish, shrimp, abalone and alligators to maturity (aquaculture);
- to pasteurize milk, to dry onions and lumber and to wash wool (industrial uses);

Space heating of individual buildings and of entire districts, is - besides hot spring bathing - the most common and the oldest direct use of nature's hot water. Geothermal district heating systems pump geothermal water through a heat exchanger, where it transfers its heat to clean city water that is piped to buildings in the district. There, a second heat exchanger transfers the heat to the building's heating system. The geothermal water is injected down a well back into the reservoir to be heated and used again. The first modern district heating system was developed in Boise, Idaho. (In the western U.S. there are 271 communities with geothermal resources available for this use.) Modern district heating systems also serve homes in Russia, China, France, Sweden, Hungary, Romania, and Japan.

Geothermal heat is being used in some creative ways; its use is limited only by our ingenuity. For example, in Klamath Falls, Oregon, which has one of the largest district heating systems in the U.S., geothermal water is also piped under roads and sidewalks to keep them from icing over in freezing weather.

The cost of using any other method to keep hot water running continuously through cold pipes would be prohibitive. And in New Mexico and other places rows of pipes carrying geothermal water have been installed under soil, where flowers or vegetables are growing. This ensures that the ground does not freeze, providing a longer growing season and overall faster growth of agricultural products that are not protected by the shelter and warmth of a greenhouse.

GEOTHERMAL HEAT PUMPS

Animals have always known to burrow into the earth, where the temperature is relatively stable compared to the air temperature, to get shelter from winter's cold and summer's heat. People, too, have sought relief from bad weather in earth's caves. Today, with geothermal heat pumps (GHP's), we take advantage of this stable earth temperature - about 7.20 – 14.44 degrees C just a few meters below the surface - to help keep our indoor temperatures comfortable. GHP's circulate water or other liquids through pipes buried in a continuous loop (either horizontally or vertically) next to a building. Depending on the weather, the system is used for heating or cooling.

In the U.S., the temperature inside over 300,000 homes, schools and offices is kept comfortable by these energy saving systems, and hundreds of thousands more are used worldwide. The U.S. Environmental Protection Agency has rated GHP's as among the most efficient of heating and cooling technologies.

HOW MUCH GEOTHERMAL ENERGY IS THERE?

Thousands more megawatts of power than are currently being produced could be developed from already-identified hydrothermal resources. With improvements in technology, much more power will become available. Usable geothermal resources will not be limited to the "shallow" hydrothermal reservoirs at the crustal plate boundaries. Much of the world is underlain (5 - 10 Km down), by hot dry rock - no water, but lots of heat. Scientists in the U.S.A., Japan, England, France, Germany and Belgium have experimented with piping water into this deep hot rock to create more hydrothermal resources for use in geothermal power plants. As drilling technology improves, allowing us to drill much deeper, geothermal energy from hot dry rock could be available anywhere. At such time, we will be able to tap the true potential of the enormous heat resources of the earth's crust.

RECENT ESTIMATION OF POTENTIAL OF GEOTHERMAL POWER BY AUSTRALIAN SCIENTISTS – A REPORT

Australian scientists estimate that only one percent of the nation's untapped geothermal energy could produce 26,000 years worth of clean electricity. The Australian government announced a A$50 million (US$43 million) project to help develop technology to convert geothermal energy into base load electricity.

Australia is the world's biggest coal exporter, with coal used to generate about 77 percent of its electricity, but Australia has a renewable energy target of 20 percent by 2020. To produce power from geothermal energy, water is pumped below ground where it is heated and the heat energy used to generate power.

The Australian government's Geoscience Australia organization has mapped the nation's geothermal energy, using temperature recordings from decades of drilling by energy and exploration firms, sometimes to a depth of five kms (three miles). A total of 5,722 petroleum and mineral boreholes across Australia were used to generate the map.

Point to Ponder

Why can't such studies be even carried out in India to evaluate potential of Geothermal Power as we have many such sites which have great seismic activities? May be it is one of the cleanest source of energy, we have never thought of and should be seriously studied to make India Energy Efficient as well as Energy Sufficient.!

About the author

Mr. F. T. Kanpurwala is a Post Graduate Gold Medalist Chemical Engineer with more than 20 years of Professional experience. He is a Certified Energy Auditor of BEE and Member of IAEMP. For more information on this topic, please contact him on (M) 098252 44796, (O) 079 – 26431716; or email at: esc_ftk@yahoo.com

My Experiences with Solar PV Technology

By: Sunil Sood

In the year 1999-2000,I had opened a Solar Shop at Bangalore. I was selling the following products:

1. Solar Water Heaters manufactured by M/s EmmVee Solar Systems Pvt.Ltd., Bangalore., with a brand name of "Solarizer"

2. Solar Lanterns manufactured by BHEL,Tata BP and a local make

3. Solar Cookers manufactured by Tata BP (Parabolic) and a Indore based manufacturer (Box type)

I sold more than 300 solar water heaters in 2 years and got very few complaints since the systems were well designed, installed and serviced by the manufacturer. My job was only booking of orders and collecting payments. I used to get 10 % commission. I had a staff of 4 persons.(2 Executives , 1 computer operator cum typist and 1 office assistant).

My sales of Cookers and lighting products were negligible. Despite branded products, I did not succeed in selling solar lighting products. Whatever I sold resulted in several complaints. The amount of energy I spent in selling and attending to the complaints was too much. On an average it was taking a minimum of 4-5 trips to sell and service one Solar lantern. Actually I lost money in selling and servicing solar lanterns.

In the beginning of the year 2001,I had to relocate to Bhopal. There again, I started marketing of solar products. Even in a city like Bhopal, I could convince people to install solar water heaters. We used to demonstrate "Solarizer" brand solar water heater on the roadside and take part in exhibitions. But we used to get many times more enquiries for solar lighting rather than for solar water heating because of wrong notions prevailing about solar lighting amongst the general public. There were many who wanted their homes to run on solar! But after hearing the costs involved either they used to doubt our knowledge and integrity or quietly disappear from the scene!

Finally, like Bangalore, same story was repeated in Bhopal . More business and profit in Solar Water Heaters but not much sale and profit in lighting business. I even tried to promote Solar Home Lighting manufactured by 'Excide Industries Ltd.". The average trips to the customer for sale, installation and servicing were 10-12 per customer. Actually, I lost more than Rs.1 Lakh in promoting solar PV products. I also know at least 2 persons who also have lost money in selling these

products. All of them (Including myself) have bound up the show! I had to even take up a job to make up for the losses!

A few enquiries about Stand alone type Street lights could not be converted into orders and resulted in un-necessary wastages of petrol and time. I was wondering how much energy goes into installing a pole to mount PV panels? Steel sections like angle, channels etc, welding, transportation to site, energy, which goes into making foundation i.e. cement etc. Then, numerous trips of sales executive, installation and service man.? A mental calculation wasn't enough so I did a calculation that goes like this:

1. 4 trips of executive to submit offer, negotiate and collect order
   Petrol consumption @ .0.50 litres per trip to & fro (LPT)-2.0 litres
2. 3 Trips of installation team - 1.50 litres
3. 2 Trips for bringing the steel, cement etc - 1.00 litres
4. 2 Trips for showing performance to the officer - 1.00 litres
5. 2 Trips for collecting payment - 1. 00litres
6. 2 Trips for servicing within guarantee period - 1.00 litres
7. 2 Trips for miscellaneous purposes - 1.00 litres

Total Petrol consumption - 8.50 Litres

I assumed that only 2-wheeler will be used by sales executive and loading auto for transporting steel, panel, cement etc.

Equivalent kWh generation if Petrol was used in Generator
@ 4 units per litre - 36 kWh

8. The energy component of steel structure (60 Kgs) including, primary energy for raw material, transportation of steel from steel plant to stockist, dealers, welding etc. -240 kWh @ 4 units per Kg

9. The energy component of cement etc (50 Kgs) required for foundation @ 1.5 units per Kg - 75 kWh

10. The energy component for manufacturing of PV Panel, Battery, luminaries, electronics, wiring, etc. and distribution of products. - ??????

Knowing well that the energy consumption under head-10 will also be more than other heads, I did not add any figure. Still the total came to 351 kWh
The Stand-alone type Solar Street Light was to provide 20 watts power for 10-12 Hours for 300 days.

The energy that was to be made available per year:

- (20 X 12 X 300)/ 1000 = 72 kWh

Even without adding any energy component under head-10 the simple energy payback was coming as 5 years. Plus, the actual energy generation would be much less than 72 kWh calculated by me. If other uncertainties are added i.e replacement of CFL/Battery etc the actual availability would be much less hence less and less generation.

Overall, after considering the above and following points, my conscience did not allow me to promote any solar PV products though earlier I was in favour of promoting them in rural areas but not any more because of the following reasons:

- I had seen with my own eyes how many street lamps installed by BHEL, Tata BP and other companies were actually working even after just 2 years.
- What was the condition of the Solar powered Traffic Kiosks installed by Tata BP in major towns of India.
- In the office of Madhya Pradesh Urja Vikas Nigam Ltd., Bhopal a 5 KW system is not performing since almost installation.
- I knew how solar PV products are performing in Villages. Except for few systems most of them were simply lying on the roofs.
- In my own house, I could not use any solar lantern for more than a year due to some or the other problems. Either, CFL were giving problem or battery was not getting charged properly. Even the actual hours of operations were found much less than the claims of the manufacturers. I spent more energy (petrol)in getting them repaired than what I saved.
- Most of the lanterns/home lights sold are not found working after 3-4 years of installation. This can be verified by an authentic survey.
- Most of the solar lanterns/home lights are actually used for emergency purposes rather than on regular basis. Thus proving all the energy saving calculations wrong.

- There was one NGO in Bhopal that had given a wide publicity that it is charging batteries with solar panels and supplying the same to street vendors in the night on a daily rental basis. They got good publicity in local newspapers. A noble mission but how they were distributing the lanterns? Using a Car run with Petrol! Of-course this car also was funded .One can imagine the net Energy Savings. On verification it was found that most of the days they were actually using electricity for charging the lanterns. This particular

NGO had got funds for this purpose and somehow they had to keep the show running. Financial or Energy Payback was not their concern.

- One of a senior officer in Bhopal has installed a solar power pack of 1 kW rating in his house thinking that he will use solar power for most of the days. But when asked, how many days this power is available he was unable to give .

Regarding Financial viability in which some returns are expected, lesser said the better. Persons, who do not even know how a financial viability is ascertained and are not aware of the ground realities, are justifying its financial viability. I am 100 % sure that presently and in the near future the PV products have no financial viability.

Regarding Grid connected Solar PV,I am not competent to comment on this. All I can say is- if it is Technically and financially viable let some private promoters install such systems in large nos. and sell the electricity under the Electricity Act,2003. Who is stopping them but the public money must not be spent on the same.

At the end I would say that if only the money allocated for promotion of Solar PV in domestic sector was spent on Solar Water Heaters the returns would have been many time more. All they had to think of is one innovative scheme, which I would tentatively call as “Donate a kW Scheme” by which all villages would have received ‘Donated Electricity’ saved by use of Solar Water Heaters in cities. Everybody would have been happy.

How this scheme will work, I will tell you some other day!

The 'Soleckshaw'

The 'soleckshaw', is a motorized cycle rickshaw that can be pedalled normally or run on a 36-volt solar battery. Developed by the Council of Scientific and Industrial Research (CSIR), the prototype was recently unveiled in New Delhi. (see photo)

The Union Minister of Science & Technology and Earth Sciences, Shri Kapil Sibal and the Chief Minister of Delhi, Smt. Sheila Dikshit launched the "Soleckshaw" solar operated cycle rickshaw, in Delhi on October 02, 2008.

The 'soleckshaw', which has a top speed of 15 km an hour, has a sturdier frame and sprung, foam seats for up to three people. The fully charged solar battery will power the rickshaw for 50–70 km.

Apart from providing environmental benefits of zero GHG emissions, the solekshaw will reduce the strenuous manual pedaling for the drivers.

Source: Press Information Bureau
Department of Science and Technology

The Cheer Column

Deft Definitions

Atom Bomb: An invention to end all inventions.

Boss: Someone who is early when you are late and late when you are early.

Cigarette: A pinch of tobacco rolled in paper with fire at one end and a fool at the other.

Compromise: The art of dividing a cake in such a way that everybody believes he got the biggest piece.

Conference: The confusion of one man multiplied by the number present.

Dictionary: A place where divorce comes before marriage.

Divorce: Future tense of marriage.

Experience: The name men give to their mistakes

Father: A banker provided by nature.

Miser: A person who lives poor so that he can die rich.

Optimist: A person who while falling from the Eiffel Tower says in midway "See I am not injured yet."

Pessimist: A person who says that O is the last letter in ZERO, Instead of the first letter in word OPPORTUNITY.

Smile: A curve that can set a lot of things straight.

Tears: The hydraulic force by which masculine will-power is defeated by feminine water-power.

Yawn: The only time some married men ever get to open their mouth.

Contributed by F. T. Kanpurwala, Ahmedabad

Upcoming Events

The 18th International Photovoltaic Science and Engineering Conference (PVSEC) January 19 - 23, 2009
Science City Convention Center, Kolkata

Details at www.pvsec18.in

Energy & Environment Conference February 1-4, 2009
Phoenix, Arizona, USA
www.euec.com

Renewable Energy World Conference & Expo March 10–12, 2009
Rio All-Suite Hotel & Casino
Las Vegas, Nevada USA

For details, contact Event Manager Kay Baker +1-918-831-9102 Direct
E-mail: kayb@pennwell.com

ENERGY & LIGHTING EXPO-2009 April 9 – 14, 2009
Palace Grounds, Bangalore
www.energy-09.com

PV America Conference and Exhibition June 8-10, 2009
Pennsylvania Convention Center,
Philadelphia, USA

Organized by Solar Energy Industries Association, USA
For details, visit www.seia.org

17th European Biomass Conference and Exhibition June 29-July 2, 2009
Conference Centre, Hamburg, Germany

www.conference-biomass.com

3rd Renewable Energy India 2009 Expo August 10-12, 2009
Pragati Maidan, New Delhi

Organized by Exhibitions India Pvt. Ltd.
Supported by Ministry of New & Renewable Energy, Government of India

For details, visit www.renewableenergyindiaexpo.com

Introduction of New Members…

Mr. Shukla

He is an electrical engineer with long experience in installation and maintenance of electrical equipment. He is presently working for NMDC in Donimalai mines near Bellary, Karnataka.

Mr. Sharavan Kumar

He embarked on a career in Marine Engineering after his graduation and is founder owner of Pipex International. He worked in United Kingdom in companies such as Mitsui OSK alliance and other Japanese companies. With an international exposure, Sharavan is well versed with the global engineering standards and has developed his own system to cater to client needs.

We Need Your Active Participation…

Do you have an area of expertise in energy management? Have you solved a difficult problem or have an interesting case study? Do you want to share a joke with others? Or just have a word of appreciation for this issue. Share your knowledge with others and promote yourself too, by writing to **The Urja Watch.**

You may also tell us about upcoming energy-related events in your area. Be sure to mention the title of the event, organizers, dates, venue, city, and contact information to get more details of the event.

Please note the following points while making your submissions:

- Articles must be original, in electronic version, 500 words or less. If you are using material from external sources, please acknowledge them.
- Please include contact information (full name, title/organization, phone numbers, and email ID) with your submission.
- Articles should be in MS word, single spaced, with easily readable font, preferably Arial size 12. Photos should be of high resolution.
- Please e-mail your submissions to Editor, "The Urja Watch" at tellsubi@gmail.com
- There are no deadlines for submissions. You may submit articles anytime.
- We reserve the right to edit, rewrite or reject any article.

We Need Your Feedback Too!

Please write your views and suggestions to the editor at: tellsubi@gmail.com
Letters must include the writer's name, address, phone and email ID.

We appreciate your feedback and thank you for your support.