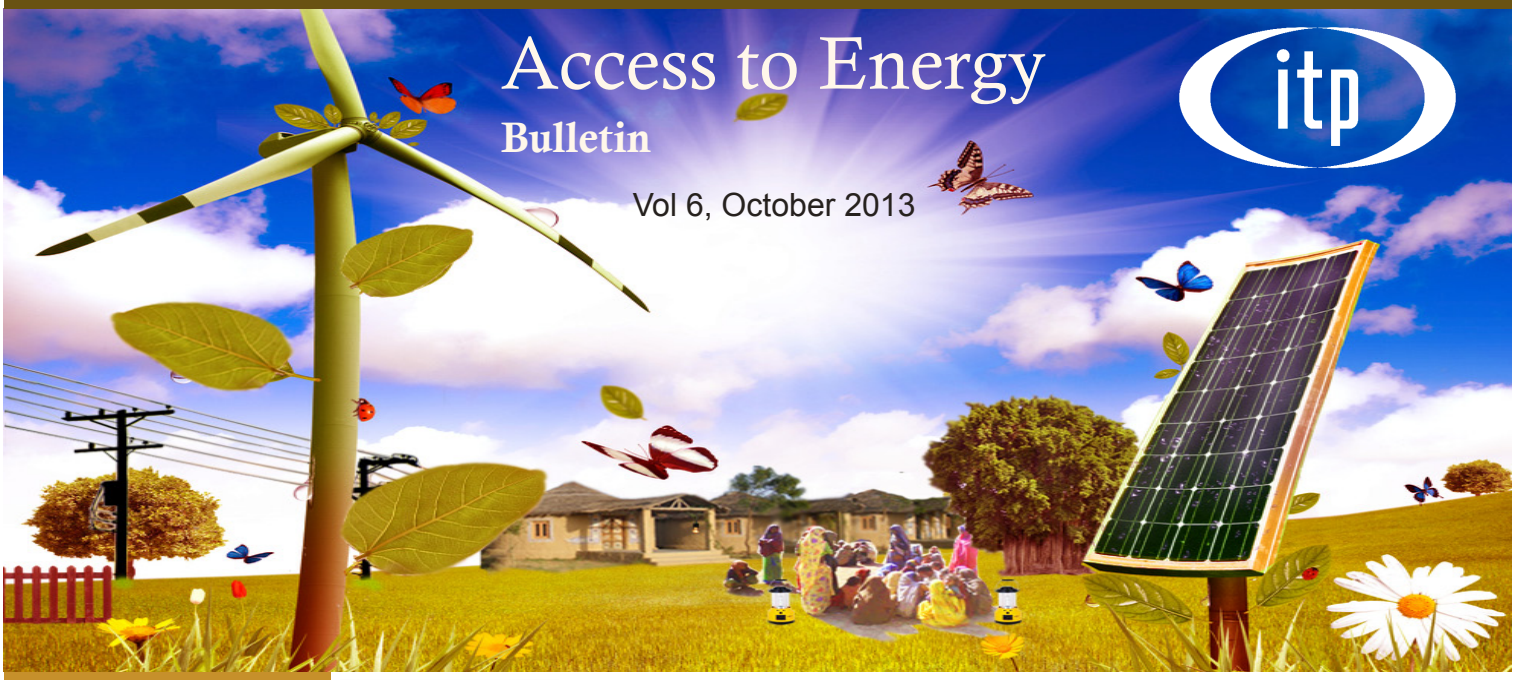

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contents

EDITORIAL

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Energy access programmes and development schemes- a confluence of approaches

The energy access challenge can be understood by three simple questions- is energy available, is it affordable, and is it being used. While the first question points at the challenges of providing physical access to safe and reliable energy products/systems and services, the second one relates to the challenges of delivering these in a manner that the target population can afford. The third one is an amalgamation of challenges associated with socio-cultural-mindset-capacities-skills-governance, etc., issues that may prevent target population to avail the benefits of available and affordable energy.

> Our actions seem to focus on the supply side of products and services, which is a top-down approach to address the challenges of energy access

The objectives and required actions for achieving the goals of *Sustainable Energy for All* focus on the first two questions. Of the three objectives - double the share of renewable energy in the global energy mix, double the global rate of improvement in energy efficiency, and ensure universal access to modern energy services - catalyze actions that are required to improve the availability of energy systems and delivery of services. The *usage or utilization* part is not necessarily addressed. Our actions seem to focus on the supply side of products and services, for instance, setting up renewable energy based microgrids, providing solar lights and improved cookstoves, piloting business models for improving the financial viability of microgrids by using telecom tower as anchor loads. Schemes dealing with rural electrification, promotion and financing of renewable energy systems etc., take the centre stage of energy access agenda. I would call this a top-down approach to addressing the challenges of energy access.

Let me propose a bottom-up approach to energy access where the focus is shifted from supply side to demand side. In

other words, focus would be on actions that provide energy systems and services to schemes and programmes that work towards achieving the MDGs, but face challenges in achieving their desired goals because of lack of access to energy. We identify such schemes that are running either in public, private or peoples domain, understand their dependence on energy access, customize the products/systems and delivery models and then target at improving access to energy to these programs so that the population can derive benefits from our actions.

> Convergence of energy with the existing schemes and programmes can address the challenge of access to energy

Let us take examples of a few flagship schemes of the GoI that deal with education and health sectors. The *Sarva Siksha Abhiyan* and the *Mid Day Meal Scheme* require reliable energy supply for powering computers and for cooking respectively. If our solar energy promotion schemes, both for PV and thermal technologies, were to collaborate, synergize and converge with the roll out of the above two schemes, we would have ensured access to energy to numerous primary schools and their wards in India thereby directly advancing the Millennium Development Goal of achieving universal primary education.

> We can identify the schemes, understand their dependence on energy access, customize the products/systems and delivery models, and then target at improving access to energy through these programmes

Similarly, solar pumps are an ideal solution for providing water in the toilets that are being built in houses and at public places under *Total Sanitation Campaign* programme . The existing infrastructure within various government departments and local institutions at district and village level can be used for effective delivery and monitoring of energy services.

There are enumerable examples from every region of the world where strong interdependencies of developmental schemes and energy access programmes can be highlighted. This issue focuses on GoI schemes that bear direct linkages with MDGs and where access to energy can substantially enhance their effectiveness and impact. The energy access agenda is all encompassing; it should not and cannot be discussed and promoted in isolation. The convergence of rural livelihoods, primary health, universal education, micro-enterprises, agriculture and other schemes with that of energy access agenda will ensure that the target population benefits from utilization of energy services in various developmental schemes, whose impacts are enhanced by improved access to reliable energy.

ITP News Update

Offshore exposure tour for stakeholders in London

IT Power-India and UK organized offshore exposure tour for the representatives of Indian industries, government institutions, and research organizations, in London. The tour aimed at providing exposure to planning and implementation of offshore wind energy projects.

CEO participates as speaker at Renewable Energy Expo-2013

IT Power-India CEO Dr Akanksha Chaurey participated as a speaker at the 7th Renewable Energy India Expo held at NCR-Greater Noida. Her session "Unleashing the Potential of New and Small Scale Renewable Energy Technologies" was attended by various experts and policy makers from accross the field of new and renewable energy.

Workshops on CDM for PHPA-2 & MHPA

IT Power-India facilitated workshops on CDM for PHPA-2 & MHPA at places called Trongsa and Kamechu in Bhutan. The two workshops focused upon unravelling the overall PHPA-2 and MHPA project plan, activities and the long-term environment and economic benefits to the local people and associations, and integrating their concerns into the project.

Diesel Generators Directory and Hybrid Systems Economics

IT Power-Australia has compiled the data behind The Diesel Generators Directory – an interactive online map to provide information about the ownership, use, location and configuration of electricity producing, diesel-fuelled generation plants in South Australia. The assignment is supported by RenewablesSA. Visit: http://www.renewablessa.sa.gov.au/investor-information/diesel-generators-directory for details.

Promotion of Renewable Energy Investments in Guinea Bissau

IT Power just commenced a project in Guinea Bissau to promote renewable energy investments, develop policy, build-up local knowledge and install new generation capacity. The project supported by GEF, NIDO and ECREE will commission 2.5MW of grid-connected and off-grid RE projects as well as provide support in the development of 50MW of hydropower.

Policy Issues

Zambia: Renewable power for isolated mini-grids

ITP Editorial Team

Introduction

Zambia is a landlocked country in Africa. The country is generally flat with tropical lowland in the north, cooler high plateau in the south, and arid grassland in the west. It has abundant renewable resources in the rural areas, which can be harnessed on a sustainable basis. There are a large number of rivers and streams in the country, as exemplified by the Victoria Fall at the border with Zimbabwe. The utilization of these indigenous renewable energy resources (i.e. mini-hydro, solar, and biomass resources) would be a very effective and sustainable alternative for the rural electrification on a decentralized basis.

Although Zambia has abundant hydropower (estimated at 6,000 MW), the installed capacity in 2001 was only about 1,700 MW. 50% of the urban population had access to electricity and only 2% of the rural population had been connected to the national power grid. The large land span, rugged terrain and sparse population in Zambia made it difficult to extend the national power grid to far-flung rural areas. The alternative in many remote rural areas, predominately serviced by diesel generators, was expensive imported diesel fuel with consequent environmental problems.

Thus, Zambia presented an ideal opportunity for international agencies to intervene and promote the use of its abundant renewable energy resources — biomass, solar, and mini-hydro, to facilitate rural electrification and promote linked income-generation activities.

In order to harness this opportunity, project - Renewable Energy Based Generation for Isolated Minigrids in Zambia, was undertaken by IT Power. Following is a brief report on it.

Activities

The project primarily aimed at removing the key barriers and reducing implementation costs of renewable energy to accomplish this goal, and adopted a holistic approach by including two main components - technical assistance and business models.

The technical assistance component consisted of activities for barrier removal including strengthening of the enabling environment in terms of policy instruments, capacity building, institutional strengthening and information

dissemination to support widespread replication and sustainability even after the project. Increased power supply and reliable energy services in rural areas would promote income-generation activities, which was a key element in the Zambian Government's efforts to alleviate poverty in these areas.

The second component aimed at setting up three pilot mini-grids to commercially demonstrate the technical and financial viabilities of using renewable energy technologies for electricity generation. The following sites were selected for setting up business cum investment models in Zambia under the project:

- A 1,000 kW mini-hydro business model at Shiwang'andu Estate
- A 1,000 kW biomass gasification business model in Kaputa District
- A 36 kW PV business model at Chinsanka in Samfya District

Mini-hydro based business model: At Shiwang'andu Estate, diesel generators were being used to generate power for a metal/wood workshop, a hammer mill for grinding animal feed, and tourist lodges. The estate also needed electricity for irrigating the coffee and sugarcane plantations, processing the coffee produced and expanding the hammer mill to grind grains as well. The local community needed electricity for the hospital and health centre nearby, and for 100

residential homes. Thus, the total electricity required in the immediate future by the estate was 500 kW.

The hydropower would be harvested from Manshya River, based on a run-of-the-river design, i.e. no dam was to be built.

Biomass gasification based business model: ZESCO had a diesel generator station serving (with two diesel generators of 267 kW and 181 kW). Due to the high imported diesel fuel cost, the cost of electricity produced from this station was in the 25-30 ¢/ kWh range. Diesel transport was extremely difficult due to the terrain and bad road conditions. ZESCO was servicing on an average 200-250 kW load amounting to about 0.9 million units (kWh) annually. Several businessmen in Kaputa had urged ZESCO to increase the power supply so that they could start fish processing plants.

In this pilot mini-grid, a biomass power generation unit (with two 500 kW gasifiers with gas engines) will replace all the diesel based electricity generations at ZESCO's Kaputa power station. The multi-fuel gasifiers will be able to use agro or forest residues as fuel. The Department of Forest under the Ministry of Tourism, Environment, and Natural Resources has agreed to participate in the pilot project, and will be responsible for managing the feed supply.

In this pilot mini-grid, the biomass gasification is expected to produce electricity below 12 ¢/kWh depending on the costs of collection, processing and transportation of biomass fuel.

Solar PV based business model: With no grid connection, the main economic activity in the rural areas of Samfya District was fishing in the nearby Bangaweulu Lake and surrounding swamp. Chinsanka is the biggest commercial centre in this district. It has 875 households and 70 shops, all clustered in an area of 2 km long and 1 km wide. Paraffin, candles, dry cells, firewood, and charcoal provide most of the current energy needs in Chinsanka.

Due to the steady income from the fishing activities, the local people in the district showed willingness to pay a higher cost for getting reliable energy services. The electricity provided could help the shops to run longer hours in business. It might also induce people to look for profitable business ventures, such as refrigeration of the fish catch to expand the sale and water pumping for irrigation of high value crops. The electricity produced might further find use in social sectors, such as providing light to schools, powering refrigerators for storing vaccines in clinics, and running water purification units to improve water supply quality.

The PV mini-grid being proposed has 36 kW peak capacity to serve 550 homes and 50 shops, including provision for overcapacity to meet future demand increase and fluctuations. The electricity charges to these homes and shops will be collected through the use of prepayment cards. The pilot project will also include 10 large solar lanterns and 10 small solar lanterns to demonstrate their use in fishing as a substitute for the kerosene lanterns. These solar lanterns will be charged by electricity generated from the PV panels during the daytime.

Results

The project helped in creating an enabling environment and enhanced capacities at national and local levels for the commercial deployment of RE based mini-grids. It also helped in increasing the scope for setting up new and innovative project financing mechanisms to attract private sector investments and thereby encouraged replication of such mini-grid projects. The project also created conducive environment for implementation of Business Models to demonstrate the technical and commercial viabilities of mini-grids based on biomass gasification, PV and small hydro technologies with their applicable financing mechanisms, and replication of renewable energy-based mini-grids for rural electrification in the region.

Energy & Government Schemes

There are a host of developmental schemes and programmes in India, both at the central and state level which address issues related to poverty and empowerment and have an impact on attainment of Millennium Development Goals (MDGs). If not all, most of the schemes require energy in some form or the other. For instance, educational schemes require electricity for lighting or running training equipment, health schemes require energy for running basic life saving equipment, and income generating schemes need energy to generate more profit and expand the scope of entrepreneurial activities. Following is a compilation to link energy with some of the existing schemes and eventually to the MDGs. It is an attempt to highlight the importance of energy and integrate it with the planning and implementation process of development schemes not only in India, but also in other developing nations.

Issues Pertaining to MDGs	Schemes/ Programs	Possible Energy Requirements/ Use	MDGs link to Energy
Women Empowerment	National Mission for Empowerment of Women	Energy is required for most of the entrepreneurial activities. SHGs or individuals may also undertake energy production/ distribution as an income generating activity. Access to energy will also help in lighting and running basic energy run devices for training girls.	Energy run machines will reduce time and physical labour of women, which they can use in other productive work. Additional income will help them take better socio-economic decisions in the familly. Use of energy at training centers will help in better skill development. Lighting villages and other public places will prevent crime against women.
Livelihood	NRLM – National Rural Livelihood Mission	Access to energy will open scope to numerous livelihood opportunities. It will help in easing constraints on already tight household budgets. It will help in improved irrigation options for better variety and increased crop production, and also for storing food.	Energy will increase efficiency and reduce time in any economic activity, which can be further used for other productive work. It will enhance profit and also increase the scope of income generation. Additional income and options will increase economic security.
Health, Hygiene & Environment	National Rural Health Mission (NRHM)	Energy is essential for lighting and running basic medical equipment in the hospitals. It is essential for charging communication devices. Clean energy can be used for cooking and other household purposes to reduce pollution .	Electricity at hospitals/homes can help avert still-birth, perinatal mortality and low birth weight. It can run several medical equipment necessary for preventing or treating diseases. Curbing indoor air pollution will reduce chronic respiratory problems.
Universal Primary Education	Sarva Shiksha Abhiyan	Energy is essential for lighting and running fans at school premises or at home. It is also essential for running computers or other equipment for training students.	Lighting school premises & homes and running other basic energy driven facilities will provide better study environment to students. Computers and other energy run equipment will lead to better training of them.

NOTICE

IRENA has recently published a paper- 'International Off-grid Renewable Energy Conference: Key Findings and Recommendations', which presents the key findings and recommendations that emerged from the roundtable discussions during the International Off-grid Renewable Energy Conference (IOREC). The conference held on 1-2 November 2012, was co-organized by IRENA with ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) and Alliance for Rural Electrification (ARE), in Accra, Ghana. The paper can be downloaded from: http://www.irena.org/DocumentDownloads/Publications/IOREC_Key%20Findings%20and%20Recommendations.pdf.

Some key messages from the report include:

- The report highlights that off-grid renewable energy systems, stand-alone and mini-grids, have the potential to play a significant role in achieving the goal of universal electricity access. In recognition of this role, their development needs to be integrated into the mainstream rural electrification strategies.
- While several successful deployment approaches exist, there is a need to scale up. What's required is a shift from the prevalent project-by-project approach, to one that focusses on the creation of a sustainable environment that facilitates large-scale deployment.
- Involvement of the private sector, and in particular of local enterprises, will be instrumental in extending electricity access in rural areas, rapidly and sustainably, and hence needs to be promoted. Off-grid renewable energy technologies produce striking synergies with sectors critical for human development, and play an important role in improving access to water supply while also extending healthcare and telecommunication services in rural areas.

Livelihood generation through Solar aided Water Purification System

Dr. Suneel Deambi

Technology Spotlight

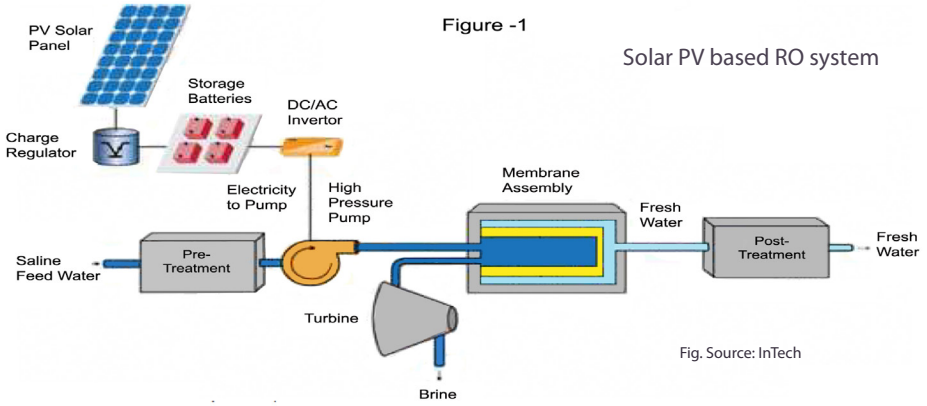

Figure -1

Solar PV based RO system

Fig. Source: InTech

Inhabitants of the sunshine soaked regions often wish the mighty Sun to stay cooler during the hazy, crazy and lazy days of summer. That seldom happens by even a strange coincidence. However, an irony exists in terms of Sun making a few glasses of safe cool drinking water. Well, reference here is to a solar operated water purification system. Rural areas especially continue to be confronted with lack of access to safe drinking water. The worst hit are probably those villages which lie in immediate vicinity of industrial towns. They face the brunt of heavily contaminated water. In contrast, the urban landscapes are dotted with eye catching presence of bottled water jars at every nook and corner. These do not find their way into villages solely due to very little or no affordability of the people there. As per the World Bank estimates, around 21% of communicable diseases in India are water-borne. The solution in sight with a genuine scope for livelihood generation, is to put up solar powered Reverse Osmosis (RO) based systems.

Understanding Reverse Osmosis

In simple terms, Reverse Osmosis or RO is a liquid filtering process. Contaminated (i.e. more concentrated) liquid is forced to pass through a semi-permeable membrane. It then blocks most of the dissolved or suspended contaminants. This process is called reverse osmosis because in a normal osmosis process, a less concentrated liquid passes into a more concentrated one. Figure-1 shows a graphical representation of a solar PV based RO system.

Key system features

Swajal Aqua is an RO based water purification system. It came into being under the project, "Swajal" and has got recognition from the United Nations Development Programme under the "Access to Energy" initiative. Key components of a solar water purification system are: Solar Modules (around 3x250 Wp), Batteries, Inverter, Water storage tank, Water pump, Water pipes, RO system & Water meters. The system capacity is of 5000 LPH but can be customized as per the actual end-use requirements. A novel feature of this system is a micro-controller scan function, which monitors the process flow on a continuous basis.

Case study-Swajal

Swajal took off in 2011 as a survey project on the conditions of water in Noida and Ghaziabad in Uttar Pradesh. Khoda and Behrampur villages in their immediate surroundings were selected for this specific study. People here pay some money for every glass of drinkable water thus limiting their daily intake of water too. Swajal has now developed detailed plans for a commercial system based on a solar powered RO system. This plan revolves around the creation of a chain of small franchised centers equipped to produce clean drinking water.

Scope for livelihood generation

The broad based scheme is to set up a number of vending machines for dispensing clean drinking water. The costs are part subsidized by the Ministry of New and Renewable Energy (MNRE). A business model has been perceived which can lessen the water contamination to a significant extent. Simultaneously, it is capable enough of providing livelihood for many families.

Clean path forward

Both the RO and Solar PV technologies are well proven and reliable too. So these can for sure tread on a well laid out path of providing the benefits of safe drinking water to a large chunk of rural population on a low cost basis. Is this not one more example of sunshine and water teaming up together for a larger cause?

Energy & MDGs

Livelihood

Samir Prasad

Poverty in real terms is a compulsion of doing any kind of work, having no education or of very poor quality, and living in an overcrowded smoky dwelling that lacks sufficient water for drinking or hygiene. In short, being poor means not having the freedom to make choices. Various reports including that of WHO clearly indicate that lack of access to energy or dependence on polluting inefficient household energy practices, stops people from breaking out of the vicious cycle of poverty.

Over the years policy makers and development professionals worldwide have become aware of the significance of energy, and various government and non-governmental agencies are intensifying their efforts to universalize access to energy. Following are two initiatives – one from India and the other from Indonesia - that have helped in improving livelihood of people living in remote areas, besides helping in improving education and health status of the community.

Case-1

(Source: Empowering rural India the RE way - MNRE & UNDP)

Indira Nagar is a small hamlet in a Panchayat called Soda, in Tonk district of Rajasthan. It consists of 13 houses with about 190 inhabitants who are mainly farmers with little or no viable source of income. Most of them have small landholdings that are cultivated for a single rainfed-crop of pulses and groundnut every year; others work as labourers in nearby towns.

The transformation started with an initiative of Minda NexGenTech Ltd. and the local Sarpanch Ms Chhavi Rajawat by setting up a solar power-based micro grid in the village. This 240-W solar power plant not only provides basic lighting to all houses but has increased their livelihood options, and consequently their standard of living. The solar power plant is based on the BOM (built, operate, and maintain) working model with each household contributing Rs 150 as the monthly charge for usage.

The plant has provided long term employment opportunity to the villagers. One of them is pulse grinding business, which involves participation of women beneficiaries from 12 households using extra productive hours during evening/night time. Another livelihood opportunity provided by this plant is that of sewing centre involving girls. In addition to these, electricity has made irrigation easier and cheaper, consequently providing increased scope for growing variety of crops.

Case -2

(Source: Ashden- www.ashden.org)

An institute called IBEKA achieved immense accolade including the Ashden award 2012, for developing community - managed hydro schemes in remote areas of Indonesia. The schemes have brought benefits of electricity for the first time to off-grid areas, enabling grid-connected communities to earn from selling into the grid.

What IBEKA does is; it develops sustainable off-grid hydro schemes in partnership with the communities. Through long-term involvement it makes sure that the community develops the skills to manage and maintain the scheme, and starts owning it; bringing a continuing source of income. IBEKA engineers do the initial local planning and help in procurement of equipment. They also provide training to the villagers. The households get several benefits besides getting cheaper and better quality light, such as running electric tools for carpentry and metal workshops. Jobs such as tailoring and agricultural processing have also become more productive in these areas.

Energy & MDGs (Livelihood)

Source: Fuel for Life , WHO

MDG Goal 1: Eradicate extreme poverty and hunger: Saving time spent being ill or having to care for sick children will cut health care expenses and increase earning capacities. Where fuels are purchased, increasing fuel efficiency and thus cutting down on the quantity of fuel needed will ease constraints on already tight household budgets. Improved household energy technologies and practices will open up opportunities for income generation. Access to electricity will provide a source of light for economic activities in the evening and a source of energy for operating, for example a sewing machine or grinding.

Sun's Silky Touch

Silk dresses have a special aura that flood any traditional occasion; but have you ever given a thought to these fine, lustrous and beautiful silk? Silk by its very definition is a natural protein fiber. There are around 4 natural silk varieties that have commercial value that include; Mulberry silk (grown in Kashmir for example), Tasar silk, Muga silk and Eri silk. Eri silk is quite often referred to as Endi or Errandi silk and is creamy-white in colour.

It is this Eri silk that has caught the attention of Bangalore based Central Silk Technological Research Institute (CSTRI) - lone institute of its kind researching on silk in India. CSTRI has recently developed a low cost solar power operated spinning machine to improve the hand spun yarn of Eri silk. The newly developed spinning machine can be run both on the solar power and via paddle operation (see the picture). This machine is able to produce up to 200 gms spun yarn in the count range of 10s to 15s. This is nearly 2.5 times more than the production by Takli-a traditional form of hand spinning device. That is not all; even the quality of yarn produced by a solar machine is better as compared to other manual spinning devices. As per the available reports, Central Silk Board is keen to showcase the solar machines during the 12th five-year plan period (2012-2017).

Product Feature

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Dear Readers,
Thank you for your aprreciations and suggestions. We hope to get similar support in the future.

Here is a scrabble you may enjoy solving.

GNERE

HBIDRY

REWPO

ATHER

SECURITY

Now pick up letters from grey boxes and make the final word.

Answers to the previous scrabble: Solar, Energy, Fossil, Fuelled & Off-Grid.