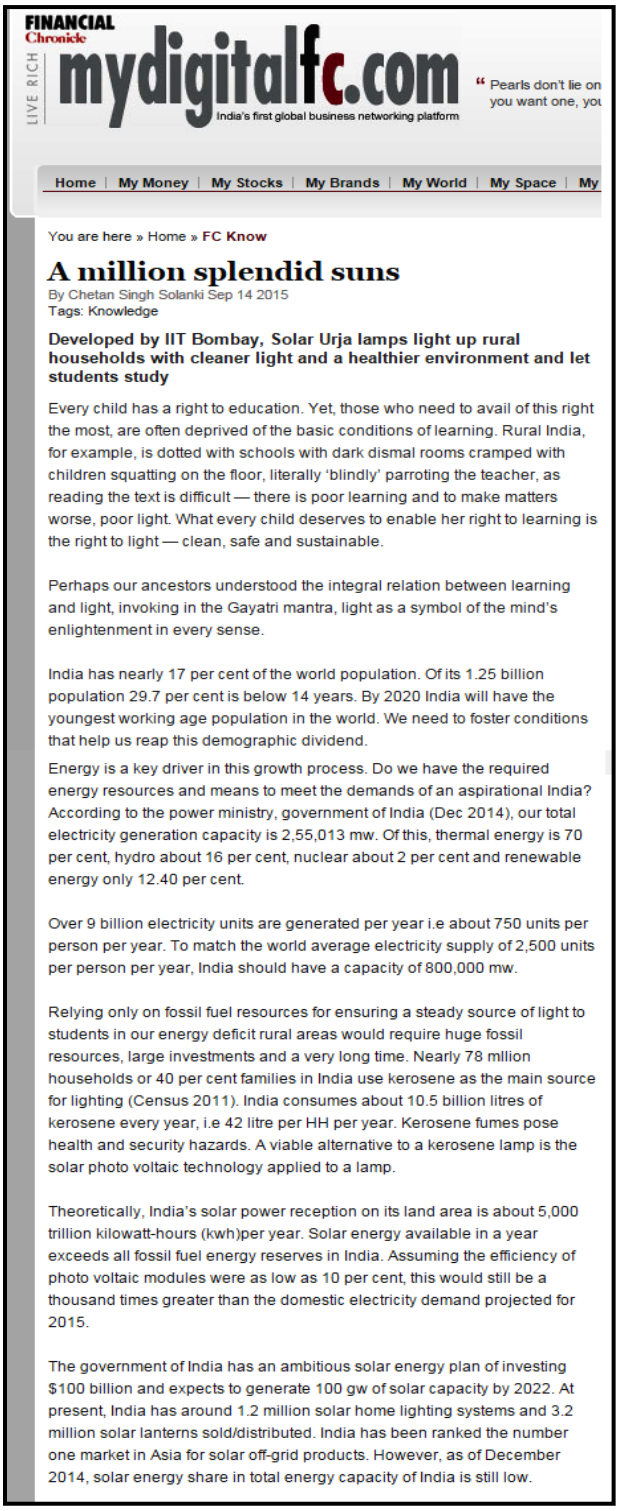
A MILLION SPLENDID SUNS
SEPTEMBER 15, 2015
FINANCIAL CHRONICLE



FINANCIAL Chronicle
LIVE RICH
mydigitalfc.com
India's first global business networking platform
" Pearls don't lie on you want one, you

Home | My Money | My Stocks | My Brands | My World | My Space | My

You are here » Home » FC Know

A million splendid suns

By Chetan Singh Solanki Sep 14 2015
Tags: Knowledge

Developed by IIT Bombay, Solar Urja lamps light up rural households with cleaner light and a healthier environment and let students study

Every child has a right to education. Yet, those who need to avail of this right the most, are often deprived of the basic conditions of learning. Rural India, for example, is dotted with schools with dark dismal rooms cramped with children squatting on the floor, literally 'blindly' parroting the teacher, as reading the text is difficult — there is poor learning and to make matters worse, poor light. What every child deserves to enable her right to learning is the right to light — clean, safe and sustainable.

Perhaps our ancestors understood the integral relation between learning and light, invoking in the Gayatri mantra, light as a symbol of the mind's enlightenment in every sense.

India has nearly 17 per cent of the world population. Of its 1.25 billion population 29.7 per cent is below 14 years. By 2020 India will have the youngest working age population in the world. We need to foster conditions that help us reap this demographic dividend.

Energy is a key driver in this growth process. Do we have the required energy resources and means to meet the demands of an aspirational India? According to the power ministry, government of India (Dec 2014), our total electricity generation capacity is 2,55,013 mw. Of this, thermal energy is 70 per cent, hydro about 16 per cent, nuclear about 2 per cent and renewable energy only 12.40 per cent.

Over 9 billion electricity units are generated per year i.e about 750 units per person per year. To match the world average electricity supply of 2,500 units per person per year, India should have a capacity of 800,000 mw.

Relying only on fossil fuel resources for ensuring a steady source of light to students in our energy deficit rural areas would require huge fossil resources, large investments and a very long time. Nearly 78 million households or 40 per cent families in India use kerosene as the main source for lighting (Census 2011). India consumes about 10.5 billion litres of kerosene every year, i.e 42 litre per HH per year. Kerosene fumes pose health and security hazards. A viable alternative to a kerosene lamp is the solar photo voltaic technology applied to a lamp.

Theoretically, India's solar power reception on its land area is about 5,000 trillion kilowatt-hours (kwh)per year. Solar energy available in a year exceeds all fossil fuel energy reserves in India. Assuming the efficiency of photo voltaic modules were as low as 10 per cent, this would still be a thousand times greater than the domestic electricity demand projected for 2015.

The government of India has an ambitious solar energy plan of investing $100 billion and expects to generate 100 gw of solar capacity by 2022. At present, India has around 1.2 million solar home lighting systems and 3.2 million solar lanterns sold/distributed. India has been ranked the number one market in Asia for solar off-grid products. However, as of December 2014, solar energy share in total energy capacity of India is still low.

An accelerated decentralised access to solar energy is needed to light up the lives of millions of families unserved by electricity. Solar lamps are one such means. By 2012, a total of 4,600,000 solar lanterns and 861,654 solar powered home lights had been installed. These typically replace kerosene lamps. The ministry of new and renewable energy offers a 30 per cent to 40 per cent subsidy for the cost of lanterns, home lights and small systems up to 210 watt rating. By 2022, 20 million solar lamps are expected to roll out.

Solar lamps, however, often function sub-optimally and die prematurely. The National Centre for Photovoltaic and Education (NCPRE) at IIT Bombay has re-energised the solar lamp by doing things locally. The centre conducts cutting edge research for cost- effective development of photovoltaic technology. Normally, transferring technology from lab to land takes time. However, the centre has forged a quick, practical connect between high- end solar research and its application in solar lamp, demonstrating that a combination of intensive research in technology advancement, field implementation and user community particiapation prove effective in enhancing impactful research and technology application. The centre has initiated the 'Million Solar Urja Lamp' or SoUL project to provide solar lamps to one million students in a quick cost-effective manner to reduce household kerosene dependency and create healthy conditions for students to study in rural areas.

The light level required for study purposes is 150 Lux, in a small area. A solar powered 0.5 watt LED lamp can provide the required light. Compared to a kerosene lamp, a solar lamp gives 10 times more light and pays back in just three to four months. Solar PV module and LED are semi conductor, long lasting devices and their cost has come down significantly.

The target is to distribute one million SoULs to students in rural India with the objective of improving their learning conditions and augmenting their learning hours through steady and safe supply of light. The spin- offs are seen as reduction of kerosene use and accompanied health hazards, local entrepreurship and greater demand for solar photo-voltaic technology and products.

The strategy hinges on localising the development of the solar lamp. Solar lamps are assembled locally, used by local people and serviced locally. By transferring technical skills, knowledge and training local people to use technology, dependency on external agencies is reduced and this is vital to popularising the use of solar energy in far-off rural areas. Localisation results in assured availability, longer lamp life, low overheads, and low costs affordable even by the poorest families. The linked chain of local assembly, repair and maintainance of SoUL also generates local employment.

For discernible impact, the SoUL project approach is to saturate a block (sub-district administrative unit) in a time-bound manner. Every school child in a particular block in a district should have access to a solar lamp. On an average, a block in India has 17,600 school children studying in classes 5 to 12. The SoUL project aims to reach out to at least 75 per cent of these school children in every block in a time-bound manner so that the present generation of students in rural areas get their due share of light for learning.

Non-governmental organisations (NGOs) are institutional partners for implemention. They are selected for their outreach, credibility, infrastructure, staff, experience of implementing developmental work in the region, familiarity with the local community, culture and language. These NGOs closely coordinate with IIT Bombay to train and empower the local community to assemble and distribute the lamps and to saturate the block.

This involves a three and a half day residential training on the assembly of SoUL, along with campaigning and distribution. The assembly training includes basics about the need for renewable energy, how solar technology works, how to assemble the solar lamp and how to conduct quality checks. In campaigning training, various methods are taught to spread information about the use and benefits of SoUL, and spread awareness about the project in general. It includes field visits to schools and night campaigning at villages. Trainees are also made aware of the goals of the project, target audience (school children of class 5 to 12), and the importance of data collection. Distribution training covers details on how to distribute through schools, maintain proper receipt records and collect baseline data of each beneficiary.

Refresher training is a one day training given to assemblers and distributors to keep their knowledge and skills up to date. This is generally held once a month. The training allows us to maintain high quality in assembly as well as distribution and data collection. Newcomers who join the team also find the refresher training useful in learning how to assemble SoUL.

Additional training is given to the NGOs to maintain proper record of the operations, including daily assembly and distribution data, record of defective components, receipt of consignments, employee (assembler and distributor) details etc. Repair and maintenance training is given to the assemblers and distributors so that they can provide repair services to the beneficiaries at the SoUL repair centres (SRCs) located at the village level.

The team of assemblers and distributors are chosen from different village clusters in the block so that after the process of assembling and distribution, they can take up the roles of repair and maintenance too. Local persons with a minimum education of class 8 are taught how to assemble and distribute the solar lamps. A special focus is made to ensure that women are also trained. About 50 per cent of the local assemblers and distributors are selected to act as managers of SRCs — roughly one for every 3,000 lamps distributed. More than 150 SRCs have so far been established. The idea behind SRCs is that alongwith their repair activity they would be able to sell other solar products at commercial rates, promoting solar technology by market mechanism. Vendors are encouraged to sell new products through these SRCs. They can be contacted directly in their local areas. A list of established SRCs with coordinates is available on the website, Millionsoul.iitb.ac.in. SoUL, thus, has brightened the pathway for three Es — energy, education and employment — and that too, in resource scarce areas.

The assembly of SoUL is a four stage process. First is the testing of components. All components are inspected for any physical damage. The battery, LED and the PCB panel are also subject to technical tests. Good components continue for assembly, and faulty/damaged ones are exchanged with suppliers. Second is the assembly of the lamp. This is a multi-step process wherein all the components are assembled to produce SoUL. The number of components in one lamp ranges from 18-25. The assembly process ranges from simple operations such as screwing in the covers, to skilled operations of soldering lead wires to the PCB. Proper procedure and importance of soldering is taught to all assemblers. The assembly process also involves intermediate testing of sub-assemblies. Each assembled lamp is assigned a unique code. The third stage involves final testing of the assembled solar lamp (now fully SoUL) to ensure that it is working according to normative specifications. Finally, SoUL is packed in cartons along with the instruction manual. This assembly protocol is followed meticulously at all assembly centres.

SoUL kits are delivered at desired locations in India by vendor partners. Among the vendor partners are Thrive Solar Energy, Sirius Solar Energy Systems, Tata Power Solar and Gautam Solar.

Importantly, SoUL is not doled but sold. Potential users — students of class 5 to 12 and their guardians are contacted to discuss the advantages of renewable solar energy and benefits and easy use of SoUL. Lamps are sold on demand to school children through their schools. Baseline data is recorded, in terms of benficiary sales, school details, their present source of electricity at home and study habits. This data is used to periodically assess the impact of SouL and set up repair and maintenance facilities.

The network for this project is complex, with five suppliers/ vendors of kits, 30+ assembly centres, five to 15 distributors per centre and a single central coordination agency (IIT Bombay). Managing the operations of such a complex network is quite challenging. Challenges include dispersed and remote locations of assembly centres, unreliable communication network and diverse nature of the workforce with minimal training in operations management. Backward-forward linkages are, therefore, critical as are procedures to monitor daily operations and records at remote centres. IT processes such as Google docs, mobile phones and android apps have been harnessed for timely synchronisation of data between remote assembly centres and IIT Bombay team.

The total cost of a SoUL is Rs 500, of which Rs 180 is contributed by the National Clean Energy Fund (NCEF), MNRE, Government of India, Rs 200 by state governments, trusts, corporate social responsibility and Rs 120 by the student.

At present, the project is spread over the states of Madhya Pradesh, Maharashtra, Rajasthan and Odisha, covering 24 districts, 53 blocks and more than 8,000 villages. About 42 assembly centres and 250 SRCs are in active operation. More than 850 local persons have been skilled in assembly and repair of SoUL and vending of solar energy products by IIT Bombay. More than 7.3 lakh lamps have been distributed in just nine months, between July 2014 and March 2015.

In order to assess the impact of the SoUL on the socio economic aspects of the beneficiary, household surveys had been conducted in all four states. The preliminary impact analysis of SoUL reveals that it is reducing the usage of kerosene based chimney lamps. On an average, household survey data reveal that 200 ml of kerosene was saved in all states where SoUL was used. Students are able to read in better and cleaner light.

SoUL has literally lit the path from cradle to grave. It has been used to light up child delivery, study hours, domestic cooking, accessing sanitation facilities or agricultural fields, local markets, shops and conducting funeral ceremonies.

The Pati block of Barwani district, a tribal block, illustrates this. Pati has a hilly terrain and people reside in sparsely populated hamlets. Just recently, a local woman went in labour in the wee hours of the night. People wrapped her in a bedsheet and carried her to the nearest road. The hospital was 20 km away. There was luckily a vehicle on the road, but it had no headlights. Since it was dark, the driver refused to drive in a hilly area without a proper headlight. Fortunately, people escorting the woman had the SoUL. They tied the solar lamps in the front of the vehicle and the woman was driven to the hospital safely.

The uniqueness of the SoUL project is that it leverages public and private funds with community participation to serve a social need, while stimulating local enterprise and self reliance. It is also distinctive in the way it forges a partnership between government, academia, business and local community to address critical development challenges of India at the grass root level by enabling access to clean energy, a healthier environment for learning more opportunities for earning and skilling people to solve problems at the local level.

Such a community empowerment model has inspired IDEA cellular, Aditya Birla group to give Rs 7.6 crore from its CSR funds to provide SoUL to 3.57 lakh students in select blocks of MP, Rajastan, Orissa and Maharashtra.

(The writer is associate professor, energy science and engineering department at Indian Institute of Technology Bombay and leads the SoUL project)