



Sri Lanka: Hot-spot for solar energy applications

By Ifham Nizam

World renowned Sri Lankan born Professor I M Dharmadasa, who is a Professor of electronic materials and devices at Sheffield Hallam University in the United Kingdom, at a Solar Energy Symposium at Colombo last week said Sri Lanka has the largest drip irrigation system and identified as the hot spot of solar energy applications. He went to say that his vision is to go for renewable energy island.

Professor Dharmadasa has been researching on solar energy conversion over the past three decades and promoting renewable energy applications over the past two decades.

At the seminar organized by the Sustainable Energy Authority of Sri Lanka described how solar power could assist in the social and economic development of Sri Lanka, using various applications at different power levels.

He said the largest impact in the short-term will come from drip-irrigation and community water pumping systems, combined with 'Solar Village' concepts introduced recently for social development.

One of the most effective ways to re-settle war-affected people and to develop the entire country would be by the installation of such systems, as a first wave of actions to improve agriculture and enhance food production.

In the second wave of actions, small industries would be established to benefit from an enhanced food production process, and a healthy export business would be developed. Other large scale solar power applications are also presented and relevant recommendations are made in order for Sri Lanka to move towards an energy independent and fully developed country.

Professor Dharmadasa has designed a 'Solar Village' project to empower and develop communities without grid-power, installed a pilot project in Sri Lanka in September 2008, and now working to replicate these projects within and outside the country. He bears dual citizenship-UK and Sri Lanka, and he is the current President of the Association of Professional Sri Lankans in the United Kingdom.

He said fossil fuels provided the backbone of the Industrial Revolution, contributing enormously to the development of modern society, but were of benefit only to some, not all of the world's population, and also polluted the environment and increased the relative proportion of greenhouse gas in the atmosphere. Population growth, coupled with climate change, mainly due to burning of fossil fuels are presenting the human world with perhaps its most severe problem and challenge in living history.

Fossil fuel is derived from organically generated carbon, i.e. former living organisms. And as such it is a finite resource - not renewable. For the past 200 years,

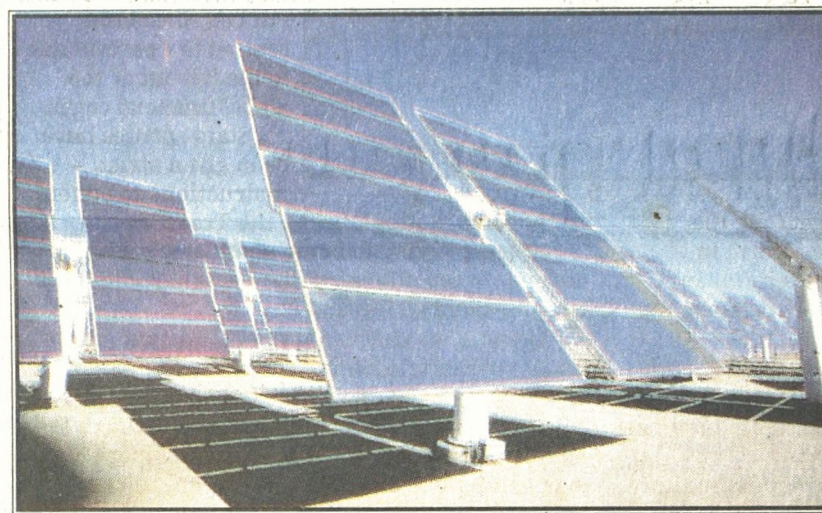


Professor I M Dharmadasa

these natural resources two have been used at an increasing rate, with no thought for sustainability and future generations, he noted. Easily accessible fossil fuels are being used, and extraction costs are rising. Therefore the way forward is to use fossil fuels in an efficient and more controlled manner, while introducing renewable energy sources, including bio-mass, hydro-electricity, PV solar, solar thermal, wind, tidal and wave. Of the renewable energy sources, solar power has the highest poten-

In early 1990s one or two local companies were struggling to install these systems, without making profits, but today 13 such companies install these systems round the country making a profitable business. There are about 130,000 three solar home systems installed in the country at present, and this is equivalent to ~6.5 MW power generation eliminating power cables around. The local solar energy companies are currently creating new jobs for young people and install about 2000 solar home systems per month.

He said this rate seems to be very impressive, but Sri Lanka has about one million rural homes that cannot be easily served by the national grid, and it would take about 40 years to complete village electrification using solar power at the current rate. To achieve full village electrification in five years,



tial to develop society and reduce poverty in the future.

The way forward with solar energy

One of the first commercial uses of solar cells in the late 1950's was as a power source for space satellites. Later, in the 1970's a large expansion was seen into small power applications such as calculators and wrist watches. These power requirements were less than 1W, but larger systems appeared in remote communication centres and satellites. In the future, these applications will continue to thrive and solar cells based on organic materials will have a place in low-power applications.

He said one third of the world's population, more than two billion people are not connected to power grids and therefore their lighting requirements are mainly based on kerosene oil.

The PV industry has developed stand-alone solar home systems powered by a ~50 W solar panel. These systems provide basic needs like lighting and power for the radio and television, and to improve health, education and the standard of living for the poorest section of the population.

The television is the main attraction for rapid market penetration of this system. In Sri Lanka, about 20 per cent of the population has no electricity from the grid and these applications have been growing rapidly over the past two to three decades.

an eight fold expansion of the solar power sector is required.

Both expansion of existing companies and the increase of the number of solar energy companies within Sri Lanka are urgently needed. Concentrating on a 'large number of small systems' will have a huge impact at this stage for the most needy people in Sri Lanka.

In current solar home systems, low power fluorescent lamps are used with DC electricity. Over the coming years domestic lighting is likely to be replaced by low power Light Emitting Diodes (LEDs), also operating on DC electricity, with minimal power. The establishment of the Regional Centre for Energy Efficient Lighting (RCEEL) in April 2009 in Colombo by Sri Lanka Sustainable Energy Authority (SLSEA) with the support from USAID is the right way forward for sustainable development in this field.

With the introduction of LEDs for domestic lighting, the solar home systems now popular in rural areas in developing countries will have applications in developed countries, also? Such LED lamps can be powered by one or two solar panels fixed on roofs in developed regions, creating a large demand for solar energy application companies. In addition to the solar home systems, there are numerous applications in the 50 W power range; street lighting, solar lanterns, solar powered parking ticket machines, and traffic lights are only some.

Being an agricultural country with about 80 per cent of the popu-

lation living in villages, Sri Lanka is likely to experience rapid development in food production with small drip-irrigation systems powered with one solar panel of ~100 W. This requires only a solar panel with 10 per cent conversion efficiency.

At present, Sri Lanka has the largest solar powered drip-irrigation programme in the world, introduced by the Ministry of Agriculture. Five thousand systems have been distributed in the dry zone and some of them are used very effectively to produce crops, increasing additional income for village families.

However, during the survey carried out in September 2008, by Dharmadasa and 80 Geography final year students led by Dr. Krishan Deheragoda - Current Chairman of SLSEA -, it was found that many systems are still not being used. The authorities who distributed 5000 drip-irrigation systems must urgently carry out a review of these, with the aim of getting as many as possible working. More systems should be installed in every part of Sri Lanka among village communities.

There is an additional problem in that distributors of agricultural products seem to be making inflated profits. This must be rectified so that benefits are returned to producers through higher margins and to customers from lower end prices.

Although the additional power produced by these 5000 systems at the place of energy requirement is only 0.5 MW, the impact of these by wealth creation, social development and reduction of poverty is substantial.

The drip-irrigation system would be an excellent way of re-settling small groups of war-affected people in the North and the East. These people would re-settle quickly in their villages and become involved in the production of food. The Jaffna peninsula is slowly becoming a desert, and the sand and palm trees are the early sign of this natural process.

Drip-irrigation using the plentiful sunshine available will quickly settle down internally displaced people (IDPs), create food we require and slow down the detrimental desertification. Introduction of organised tree planting projects will convert this sandy land to a 'green carpet' 'haritha piyasa' converting this arid area to a pleasant oasis.

A solar powered drip-irrigation system; an excellent method to re-settle war affected people rapidly, improve agricultural crops, stop desertification in the North and convert the country into an Eco-Tourist Centre, believes Professor Dharmadasa.

Speaking on Solar applications in (500-1000) W range, he said there are numerous applications in this power range. An 800 W system has been installed at Hunugallewa School in Gallempawa Electorate, to power computers in the school. The school has no electricity from the national grid, but about 850 school children benefit from this modern facility to learn using new technologies.

Information Technology (IT) is the key to modern society, and all school children should be exposed to these new technologies from their early stages of studies. During the survey carried out in September 2008, the team from Sri Jayewardenepura University (SJU) used this school premises to have their picnic lunch and observe the new developments.

He said the 80 university students who participated in this survey, came from different parts of the country, and were very impressed by the way the school buildings were embedded among the indigenous fruit trees such as mango and others, producing a cooling effect.

All buildings present in the school were not obvious until one walks through the pleasant environment. This kind of project helps the young students to realize how our buildings can be built using the coolness of the natural environment, without using power hungry artificial air conditioning equipment, he said.

Solar powered telephone booth (IT network) can be installed where there is no grid power. Providing communication and easy transport (Roads network) will accelerate the rapid development of the country.