
Bhagavan's Interest in Solar Energy Sciences

In a Divine discourse, delivered at the Institute Auditorium in Prasanthi Nilayam on March 4, 1993, Bhagavan said :

"To the people of India, energy from the Sun is of paramount importance. It embodies a supreme element of sacredness. On account of the stupendous order of temperature in the core of the sun, enormous quantities of hydrogen-several million tons - get transformed to helium every second. By this process, which began with creation and will go on for aeons of time, a tremendous quantity of energy is radiated by the sun. If even a tiny fraction of the solar energy that reaches the surface of the earth is put to use, intelligently and diligently, the energy needs of the human race will be met in an adequate measure".

"Scientists continue to be baffled by the mystery surrounding the origin of Light. Light is God's gift to mankind. While we are greatly impressed by the power and grandeur of the radiance of the Sun, we need to ponder deeply over the effulgence of the Divine, which is more than that of a million Suns put together.

"Using electronic devices and associated instruments and facilities, we should devise effective steps to convert part of the Sun's energy that reaches us to electricity directly. I want this Insti-

tute to devise ingenious ways of putting the energy from the Sun to productive and humanitarian uses."

POWER OF THE SUN

The Rig Veda highlights the importance of the Sun in these words:

"Let the world focus its constant attention at the centre of the planetary system, where the Sun, the supreme power of the Universe, resides."

The Sun is a star with a mass which is more than 330,000 times that of the earth. It is said that, if the weight of the earth is notionally one ounce, the sun would tip the balance at 10 tons. Sunshine reaches the earth across 93 millions miles of space in a little over 8 minutes. Infra-red radiation accounts for the sun's heat. The earth and all the eight sister-planets together intercept less than one-thousandth of one millionth of the total radiation. The fusion of hydrogen into helium, whereby the sun is continuously converting its substance into radiant energy, takes place at an estimated temperature of 30 million degrees Fahrenheit. Even the sun's Corona is believed to reach a temperature of 2 million degrees. The surface, at about 10,000° F or so, is relatively cool! A square yard of the earth's surface, exposed to direct sunlight, continuously receives the radiation equivalent of 2 horse-power of energy. It has been suggested that, in three days, the earth re-

ceives as much energy as some estimates of the total fossil-fuels remaining on earth; and in forty days, enough solar energy is received to last a century, if only we can make diligent use of all of it.

Nature provides us with energy far beyond our dreams, in spite of the easy lives we have led on our fuel reserves. Solar energy is available in staggering quantities. It is free and it requires no transportation or maintenance. The power is there for the taking; but the taking is not easy for man spoiled by the luxury of access to stored energy - not as easy as digging holes in the ground and mining coal or drilling holes into the handy, subterranean storage tanks of gas and oil. Yet the harnessing of sunlight should be easier than unleashing nuclear energy - which, despite all our efforts, remains a tricky and treacherous source of power.

Serious attention to the application of solar energy has had to wait till man realized that he is dangerously close to the bottom of the stock-pile that the Sun had gifted to him. He should have begun to use solar energy directly a long time ago. The dubious promise of Nuclear Energy has also delayed this process. Astronomer Donald Menzel likens the Sun to a husband who is so dutiful and dependable that he is not fully appreciated. "The Sun's extreme regularity keeps us from noticing it. In the ultimate analysis, it is the squeaking wheel that draws our attention and gets the grease. The Sun is just too quiet to get our attention".

THE ENERGY GAP

It is estimated that fossil fuels have been produced over a period of 600

million years. This process is continuing at about the same rate. We are using up energy at a much faster pace from fossil-fuels than the Sun replaces it. In the last century, we appear to have withdrawn 20 times, as much capital energy as we did in the previous seven centuries.

Both population and energy consumption are destined to climb up. Coal, natural gas, oil and hydro-electric power are the principal contributors in the energy scenario. A century from now, nuclear energy may match coal in producing power. The awesome reality is that there is a 20% gap between demand and supply and this is likely to increase to 30% in a couple of centuries. If the gap is sought to be covered by increased deployment of non-renewable energy sources, there are two great dangers, rapid depletion of these resources; the pollution enhancement which will have a gruesome impact on the quality of life on earth. We must drastically reduce our demands on power or find a new source of energy. We are at present dumping waste-heat into the environment. It is estimated that, by 2000 A. D. , the ambient air-temperature will increase by 2.5° F. This will have a most deleterious effect on the ecological balance of the earth.

Once in a few decades, a new source of energy surfaces. In 1870, coal began to replace wood, water-power and wind-power. Some 45 years later, gas entered the fuel picture. Oil was discovered in 1859; and hydroelectric power became a reality in 1890. The first nuclear power-plant was set up in 1957. In this cyclic process, by the year 2000,

another major source of power has to emerge. It could be 'nuclear fusion'. Hopefully, we can make it 'Solar Energy'. Solar batteries have no moving parts. No fuel is required; and no waste-product is produced. There is no question of thermal pollution at all. For simple elegance, nothing can match the marvellous bank of solar cells that simply sits under the sun and converts light to electric power.

THE PHOTOVOLTAIC

A photovoltaic Cell, or Solar Cell as it is popularly known, is an electronic device that produces electric power when light falls on it. The principle underlying this is the Photo-voltaic effect. It is for the discovery of this effect that Albert Einstein was awarded the Nobel Prize. The current produced may be made to flow through a circuit and perform several useful functions.

The main challenge today is the imperative to improve the conversion-efficiency of the Solar Cell and to reduce the production-cost of the device. Scientists all the world over are working on the related problems.

The energy-conversion brought about by a solar cell is fundamentally different from other forms of electricity-generation. Without turbines, generators or other mechanical equipment, it more closely resembles photo-synthesis- the bio-chemical process that forms the energy basis of life on earth. This ubiquitous device contains the seed of a peaceful transformation toward an ecologically sound and sustainable energy-system.

Photo-Voltaic Cells have been pressed into service, in terrestrial applications, only over the last thirty years or so. A stimulus was imparted to this effort by the Oil Crisis of the 1970's. Early on, they were used exclusively for powering satellites in space, because of the twin-advantages of low-weight and no-fuel requirements. In today's scenario, we see Solar Cells being used for water-pumping, lighting, drying and such functions. Solar electricity systems are being set up to provide refrigeration in remote locations. There is scope for solar-powered houses in rural areas which have no access to utility power-lines. There is the prospect also of Photovoltaic Systems being installed at large Centralized solar-electricity Stations operated by public utilities, helping to diversify energy-sources feeding into power-grids.

Photovoltaics have a strategic value which other energy sources lack. They make power, though in small quantities, available in virtually any corner of the world. Rarely have the common people had a chance to benefit from an advanced technology as in this instance. Photovoltaics not only help to remove drudgery from the lives of rural people but, by helping power communication systems in these locations, educate them and bind together sections of society. The potential contribution becomes visible through the joy experienced by those, living in remote locations, who see running water for the first time and those using solar electricity to refrigerate their food and medicine. Arising from the use of this technology that seeks to deploy a 'noble' form of energy, the living stan-

dards of people all over the world will significantly improve in the decades to come. It is a blessing that man's attention is being focussed on the direct use of solar energy for his survival. It is equally fortunate that 'none is hidden from the heat of the Sun'. This is the essence of Bhagavan's Message.

MIRACLES IN PRASANTI NILAYAM

Bhagavan Baba has produced the miracle of unique educational system which radiates its message world-wide from Prasanti Nilayam. It demonstrates the power behind the synthesis of 'intellectual knowledge' with 'spiritual wisdom', out of which emerges the vision of 'integral education' that grows in an environment that promotes truth, love and reverence. The second miracle is the Institute of Higher Medical Science, which with its superbly constructed habitat, fine array of technical equipment and health-care programmes of surpassing excellence, provides to numerous

persons in need the bounty of medical attention and cure in the same spirit in which God provides sunshine, air, water, soil and sky to all mankind. The third miracle which is just unfolding, is, by the Divine command, the beginning of a high endeavour to capture a tiny part of the Sun's energy falling on the earth and convert it to a form of power that people may use facilely for a variety of useful purposes-because such an effort will do good to human society and make the world more viable and more livable than it is to-day.

We are at the Lotus Feet of Bhagavan Baba, who is ceaselessly at work for the good of mankind and commands the supreme wisdom to know what that good is. He demands from us our consecration to a noble endeavour. Let us execute His Will sincerely and integrally in every detail of our evolution as His beloved children.

*S. Sampath,
Prasanti Nilayam.*

FIVE VITAL POINTS OF CODE OF CONDUCT

What exactly is your duty? Let Me summarise it for you. First, tend your parents with love, reverence and gratitude. Second, speak the truth and act virtuously. Third, whenever you have a few moments to spare, repeat the Name of the Lord, with the Form in your mind. Fourth, never indulge in talking ill of others or try to discover faults in others. And, finally, do not cause pain to others, in any form.

TEN FOLD SIN

Keep away from the ten-fold sins, the three physical, the four verbal and the three mental. Physical tendencies are: Injury to life, adulterous desire and theft. The verbal sins are: false alarm, cruel speech, jealous talk and lies. The mental attitudes are: greed, envy and the denial of God.

- Baba