

ACADEMY STREET NETWORK

The monthly newsletter of the
National Solar Power Research Institute, Inc.

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WELCOME

Welcome to the first issue of Academy Street Network and Review. With oil becoming increasingly political, world deforestation causing increasing environmental devastation, and coal combustion contributing to the greenhouse effect, it appears as if solar energy warrants renewed interest. The solar energy pioneers remain and are as active as ever and it seems as if they should be given more of an opportunity to share their lessons with us. Yet, despite a steady stream of advances in solar energy technology, human society is far from being solar powered. In 1990, photovoltaic energy production constituted considerably less than even 0.2% of total U.S. energy production (according to a U.S. Dept. of Energy report).

As its name implies, the National Solar Power Research Institute, Inc. (NSPRI) is concerned not merely with the state of solar energy technology, but the ability of our society to deliver specific quantities of power within the definite future. This is your future as well as ours, and the availability of plentiful, environmentally-safe energy is essential to maintaining our standard of living and our increasingly information driven-democracy. Consequently, we hope that this newsletter will help empower you to be able to create the kind of future you and your descendents can look forward to.

While Academy Street Network discusses the state of solar power, it is meant to be an analytical, even occasionally critical review. If there are issues adverse to the growth of solar power, this newsletter wants you to know about them, so you can make an informed decision or help resolve them better. — *Mark Ciotola and Dalia Liang.*

SOLAR POWER IN AFRICA

Africa, as a continent, has tremendous solar energy capabilities due to the proximity of most of its land mass to the equator. At that latitude, most of Africa will have 325 days of strong sunlight. Most electrical systems in many African countries are quite obsolete, as they date from the colonial era. Hence, the potential for the development of solar energy

as an alternative to building nuclear power complexes is considerable and should be seriously examined. A new, massive energy / electrical infrastructure is really possible. Although Africa presently generates less than 1% of the world total from nuclear, its growth in nuclear has been the world's fastest since the mid-1980's. Further, even if the effects of pollution caused by extracting, refining and burning petroleum are ignored, Africa's estimated petroleum reserves of 60 billion barrels are insufficient to supply the entire population of the continent in the long run. Therefore, even though solar energy is still undergoing development to reduce costs, the demand is there. For many reasons known to us all, Africa has remained virtually clear of any industrial pollution: the use of solar power in these regions will most likely reinforce this latter aspect as well as initiate a certain resource boom. — *Abdoulaye M. Yansane.*

PUTTING IT IN PERSPECTIVE:

Though anything you do to help may be insignificant, it is still very important that you do it — (from a quote by Ghandi).

You Are Important. I look up in the sky at night, I see the twinkling of little stars. When compared to those stars, life for us seems short, like the brief flash of the shooting star against the dark night sky. Though life is short, we nevertheless leave our footprints in the universe. Passively, we perpetuate, keeping the human species from extinction, and continuing the traditions and cultures of our ancestors. Actively, we can add color to our culture by being an artist, novelist, philosopher ... or we can, like an Einstein or a Galileo, extend our knowledge of the physical world. Like it or not, those footprints we leave behind could be tiny or as big as the legendary "bigfoot pizza." Everyone of us is definitely doing something that effects the universe, whether it is contributing toward a new future for humanity or the illumination the face of a planet with the flash of nuclear destruction. — *A. To.*

NSPRI Synthesis. You have probably heard the joke about energy these days — "they don't make it anymore." It is a bad joke but illustrates the point pretty well — we have to make the most of what we have. That is in part, what NSPRI is about. The facts regarding

the present condition of world energy resources and the consequences of such will be well-documented in future issues of this newsletter. For the present, let it be sufficient to say that it is in our interest to explore alternative sources for the sake of our future standard of living — NOW!

The potential of solar power has been examined from different angles in the past, but NSPRI is taking another approach by creating the framework for NSPRI volunteers to engage in short term research projects that will directly explore the use of solar energy, along with research into other indirectly-related areas. The idea is that connections can be made between some of these ideas, with the resulting syntheses to make otherwise unworkable ideas practicable. To borrow a bit from James Burke and his series "Connections," when one looks at our history, many of the developments that helped bring about the world as we know it were not simple inventions that one person or a small group of people invented out of nothing. More often, somebody took several ideas that happened to be lying around, putting them together in a different way and perhaps adding another piece or so, and coming up with a new piece of equipment, process, or other idea. As it stands now, research is being done in a number of different places and published in even more. There does not exist, to my knowledge, any organization for investigating these results as yet to see how they interrelate. One of the goals of NSPRI is to perhaps fill this gap. It isn't entirely unlikely that we may find out that there are other, better methods to meet our needs, or perhaps we will need a combination of different methods. But until we investigate the possibilities, particularly the less obvious ones, we won't know. — *Peter Spangler.*

REPORTS

Technical Concepts Division: The Solar Battery Charger Group completed Phase One toward its development of a economical, easily constructed battery charger by constructing a prototype device capable of charging a typical 1.25V AA Ni-Cad battery. The primary goal of

this phase is to assess difficulties and critical factors involved with such devices. Phase Two will focus on reliability factors. A initial literature search is being undertaken to determine the state of the technology of photovoltaic cell technology (David Lewak). A directory of solar energy-related resources available on the internet is being compiled (Peter Spangler).

Educational Programs Division: Initial drafts of physical science term translation sheets have been completed and are pending review (Jean Wu - Chinese/English; Ri-Xi Liang - Spanish/English). The University Programs Group is presently studying possible liaison activities.

Policy Division: An initial study of domestic energy policy decision-making is being undertaken (M. Ciotola). Information-gathering has begun for a qualitative survey of the domestic solar energy industry and retail system (A. To). The Division will be providing a host site for the February 17th "A New Era of Discovery: Plans for Research on Space Station" videoconference for the purpose of focusing on the possible use of the space station to study space-based solar power.

World Studies Division: Initial literature studies are presently being undertaken for the following areas of the world: Africa (Abdoulaye Yansane); North America (Olivia Mah); and Belize (Karla Gottlieb). Other areas will be studied later.

ACADEMY STREET REVIEW

Article review: Ugar Ortabasi, "A Hardened Solar Concentrator System for Space Power Generation: Photovoltaic Cavity Converter (PVCC)" **Space Technology**, 1993, pp. 513-523 (Pergamon Press). This article proposes a space-based solar collection device that may be a possible step from traditional arrays to anticipated giant reflector/concentrator dishes. The Photovoltaic Cavity Converter (PVCC) is used in conjunction with a Cassegrainian mirror system so that all of the light collected falls upon the optical window of the PVCC. The PVCC is a sphere similar to the human eyeball that acts as a perfect blackbody absorber while protecting the photovoltaic cells lining its interior from the space environment. — *Mark Ciotola.*

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