S.T.E.V.E.N.

Sustainable Technology and Energy for Vital Economic Needs

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N E W S L E T T E R 2 0 1 0

GREETINGS to our friends and to all others interested in work to develop Sustainable Technologies and Energy, for Vital Economic Needs. In this, our 25th year newsletter (since S.T.E.V.E.N. Foundation incorporation in 1986), we provide an update on our ongoing work with solar oven-cookers; an outline of the progress to develop a small "family-size" wind turbine; and notes on other technologies and materials available.

Collaboration with Solar Oven Research at Cornell University: During 2010 we had continuing collaboration with the solar oven research program housed in the School of Civil and Environmental Engineering, which is supervised by Tim Bond, Manager of the Bovay Civil Engineering Laboratory. Each semester since 2003 teams of between 6 and 12 students have worked under Tim's direction to test and apply various engineering techniques to the improvement of solar oven performance. Francis Vanek has been able to assist, both in his capacity as a researcher and promoter of solar ovens from the S.T.E.V.E.N. Foundation, and also as a personal user of solar cooking in Ithaca from April to September each year.

This year the students worked on advancing a concentrating cooker design that uses parabolic shaped reflective surfaces to concentrate solar rays onto a cooking surface, with the potential to achieve higher maximum cooking temperatures than a box oven of the type promoted in the S.T.E.V.E.N. website. They also carried out experiments to measure the insulation efficiency of wood shavings and rice husks, two materials found widely in tropical countries, compared to fiberglass, a benchmark manufactured insulating material. Francis was especially involved in a third project, namely the construction of a modified version of the slanted-glass oven, which was added to the manuals in the website three years ago. At the end of the 2010 cooking season in September, Francis lent the team the slanted oven which he currently uses, and the team modified it to have a higher angle slant and an improved latch mechanism.

Each year during the spring semester the solar oven team sends a group of students to visit two partner organizations in Nicaragua, Grupo Fenix in Managua, and Las Mujeres Solares de Totogalpa (The Solar Women of Totogalpa), who are based near the border with Honduras. Tim Bond has usually accompanied these visits, but this year Francis was able to accompany the group in his place. Although the Cornell student team worked largely autonomously (Francis was very impressed with how self-directed they were) he did assist them in their project of building two ovens

using local materials, and also exchanging information with the partner organizations about how to disseminate and improve solar ovens and solar cooking. Each member of the nine-person team stayed with a family in the local community.

Wind Turbine Work: The S.T.E.V.E.N. Foundation, in its twenty-fifth year, was characterized by research activity on a low-cost, family size wind turbine. Our work led to some preliminary results, but not final solutions.

First we worked with several designs of the wing/rotor configuration, always keeping in mind the requirement of low cost, and also resistance to high winds, which is the stumbling block of low cost windmills. At least conceptually, but also through practical solutions, we came to some definitive results.

Resistance to wind, even to the level of a hurricane, we find must be based on two partial solutions. The first is that the entire "core" of the mill must be made of solid iron or steel, welded together. This implied my learning the skill of welding. I have produced one rough core of a mill, but with most imperfect welds which I will have to ask some better welder to go over with me.

The second is to create the wings or four branches of the rotor from a low cost replaceable material, if possible one which detaches itself in strong wind without destroying not only the steel structure but also the wings. Here we are finding the inspiration from sailboating, using a set of sails or jibs controlled by a simple system of releasing cables or strings.

We now have the elements of a low cost solution for generating electric power. The key problem here is that our low cost turbines turn at best at one RPS—and typical dynamos or alternators call for RPS of the order of fifty times higher. But here comes to the rescue, once again, the good old bicycle, in two stages. One involves a triple increase of rotation through the bicycle chain transmission, and the other an augmentation about twenty times between a solid bike wheel and the rotor of the dynamo or alternator. The latter duality we are now working on, depending on costs and relative efficiency. The photo shows an image of one of our many solutions with wings and the bicycle-type transmission.

Other notes on our work: Our **solar icemaker**, developed in early 1990's and documented in an article in HOME POWER magazine, June 1996, continues to bring us the most mail. While S.T.E.V.E.N. is no longer working to advance this technology, we recognize its importance. We refer inquiries to the more advanced work of Energy Concepts, a commercial firm which has its "ISAAC" solar icemaker in use in various locations. (See: EnerConcep@aol.com or SolarIceCo@aol.com) Yet we realize that this solution is not economically possible for many parts of the developing world where solar refrigeration could be an optimal technology, for both economic and environmental reasons. So we make this proposal: anyone who has contacted S.T.E.V.E.N. and would like to network with others to further icemaker development, please write to us, and we can help establish the network. Perhaps this step forward could happen in 2011.

Solar ovens are also a subject of inquiry from many quarters. We note with interest the news transmitted by Solar Cookers International (SCI) in their recent newsletter, of a new Global Alliance for Clean Cookstoves. More information on this initiative can be found at solarcooking.org/scwnet, or email: scwnet@solarcooking.org

3-M Mylar is still available from S.T.E.V.E.N in modest quantities, typically for one or several cookstoves, or a solar collector. We appreciate a donation of $1. per sq.ft. In return we cover postage and shipping in USA.