

So, what did you do this summer?

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I saw a dream. I saw a dream of our world this week. I saw a dream in the eyes and on the faces of our future. I saw eager faces, dreaming faces, fun-filled faces. Faces that were eager to learn. Faces that said, “Feed me, nurture me, mentor me, tell me what I must do to make our dream come true. Let me dream with you, let me help you reach your dream. Let me make your dream my dream. Extend your hand. Let me reach for it. Let me reach for our dream together. Teach me. Teach me to go where you have gone. Show me where you have been. Show me where I must go. Tell me I should extend my hand to my brother, my sister along the way, my son, my daughter. Show me how to nurture, to dream, to build, to make our world a better place. Show me what is good. Show me how to keep our world from turning against us. Show me how to keep it a safe place for me. Show me how to keep it a safe place for those I, too, will be showing how to dream. Take my hand. Please, show me the way!”



Take my hand. I want to learn. . .



. . . guide my hands—let me be involved

And so it was, the first day of the DOE-NREL REAP fifth annual program review, in early August, at Arizona State University in Tempe, Arizona. A group of dreamers gathered for a purpose. A group of interns from half a dozen universities who had been studying alternative energy during the summer. Alternative energy that will, some day, keep this world safe from the ravages of fossil fuel fallout.

University students understand acronyms. Lay mortals don't. DOE is the Department of Energy. NREL stands for the National Renewable Energy Laboratory, while REAP stands for Renewable Energy Academic Partnership. One of the major educational efforts is the DOE-NREL Minority University Research Associates Program (MURA). This is a program that places select, bright dreamers from predominantly minority universities in a summer intern program to intensively learn about alternative energy. At the end of their summer internships the group was brought together to share what they learned with their peers and mentors at the REAP Conference at ASU. More than forty such interns came together in Tempe in the first week of August. Oral and

poster presentations laid it all bare. Accompanied by their professors, the interns spent three days telling and showing what they had done—and getting used to Arizona’s August heat!



Back pack and water bottle—I’m ready for you to show me the way



I may need a solar attenuator, such as this REAP one worn by Jessica Newton

During the practical exercises on the last day, all participants showed the same eagerness they’d displayed during their peers’ technical presentations. Taking photovoltaic module in hand, along with a multi-meter and a variable load, as well as outstanding help from the Arizona sun, each participant began gathering I-V curves (that is, current and voltage measurements) that displayed the module’s worth. For technical people it was just what the doctor ordered—electrical measurements they can do and do well—or just another electrical lab.



Turn the knob on your load. . .



. . .then record the current and voltage. Repeat.



Working in the sun deserves cool, cool water. . .



. . .even a cookie for a cookie monster!



PIs (Primary Investigators—read professors) need a break, too. . .



. . . and maybe even a chance to pose in PV operated fan-cooled safari solar attenuators

Continuing with practicals, another learning session aimed at cutting out all the needed parts, then cleaning, coating and assembling the parts into one working fuel cell. Fabricating the device under heat and pressure (provided by two electric heaters imbedded in two aluminum blocks, jammed together by a simple hydraulic car jack) resulted in an assembled fuel cell. Taking this to the test bed, I-V data on this do-it-yourself fuel cell were taken. Most students were successful, but others found that short cuts led to disaster—and non-functioning cells.



This is cut-and-paste, but not using a computer



Clean your fuel cell membrane



Make sure you have the right material



Put your membrane in a vacuum. . .



. . . then get the pressure right—use some MUSCLE



This is what I got—is it a good fuel cell?



Here, see what we've done? Look at our fuel cells!

Most students were US born and raised. There were, however, representatives from Nigeria, Democratic Republic of the Congo, Colombia and India.

Check out some of the titles of their summer's work:

Residual Stresses and Electronic Properties in multi-layer thin films and quantum dots;

Characterization of Conducting Polymer for Solar Cells Application;

Optimal Power Dispatch of a PV System with Gaussian Distributed Power;

Fuel Cell Based UPS System for a Desktop Computer;

African Solar Village Outreach Program;

Photoelectrochemical Production of Hydrogen;

Carbon Nanotubes for Hydrogen Energy Storage;

Biomass Research and Development Control Design Engineering;

Performance of Concentrator PV Trackers;

Community Limitation on Renewable Energy Forms.

If you aren't a technical person or have followed developments in these fields, the work by these students will fall on deaf ears plus glazed-over eyes. All of the above topics are important in the search to understand. . . the search to understand and develop practical world-usable renewable energies.

Perhaps the future in the above areas will include study in depth leading to Masters and Ph.D. level work. This is quite likely, as 20% of previous years REAP participants have gone on to study at the doctoral level.

Included in the program were presentations from people who have been there, done that. Taft Mohair, a 31-year-old electrical engineering graduate, who says he's not a motivational speaker, motivated the group anyway by telling them how they must present themselves when writing resumes. Not only should resumes be up-to-date, ready for when a recruiter comes to campus, but in a snappy, succinct short-form as well as a two-page more detailed work if the recruiter wants it. But most importantly, don't stretch the truth!

Why was the student audience paying attention to Taft? Because he heads his own company and is associated with another group that runs a \$300 million company. When an individual is successful, people pay attention.

Words from Dr. Stephanie Adams didn't fall on deaf ears, either. Her description of setting goals and then pursuing them to fulfillment wasn't lost in the sea of eager faces who captured her every word. She recounted that to reach her goals she gathered mentors and a support network. Mentors who believed in her—and she in them—which led first to a bachelor's degree in mechanical engineering, and finally the Ph.D. in Interdisciplinary Engineering. It was a team effort.

We are all working on our own headstones, she suggests, as we'll all get one sooner or later. One's date of birth will be inscribed on it, as will the date of death. Separating the two will be a dash. It's this dash that she is working on, to make certain it will be something outstandingly memorable of her life, more than just the separator between two dates. Is she saying that we should make our life on earth one superbly memorable dash?

Awards were given the interns for technical content of presentations, as well as the best oral presentation. Doryne Sunda-Meya of the Democratic Republic of the Congo

(formerly Zaire) won for her style of presentation. She was quite surprised, as when she came to this country seven years ago to study, she could hardly speak English. To have won a prize for communication skills may have been surprising to her, but it simply recognizes her hard, dedicated work.

This week was, indeed, a learning experience.

Schools participating in the REAP program this year were:

Southern University and A&M College

Central State University

Hampton University

Texas Southern University

North Carolina Central University

North Carolina A&T State University

University of Central Florida

Ohio Aerospace Institute (OAI)

Clark Atlanta University

Fisk University

Florida Solar Energy Center