THE WINSTON REPORT

Winston Solar Challenge starts in Round Rock *Five cars qualified for the Round Rock to Cocoa, FL 2003 Dell-Winston Solar Challenge cross country race. Teams from Mississippi, Indiana, New York, Colorado and Mexico competed on the 9-day event. The winning team from Miss. drove a total of 689.2 miles.*

Solar cars must pass rigorous testing to qualify *Mike Landrus serves as a scrutineering judge for the 8th year. Other TXSES members included Dave Dixon, Randy Combs, and Kathryn Houser.*

TXSES members act as scrutineering judges *Tom Fitzpatrick gives a close look to the structural integrity of a solar race vehicle.*

Cars prove their road worthiness *Lorin Vant-Hull verifies speed to test the car's breaking ability.*

Web based renewable energy courses offered through West Texas A&M University

WIND ENERGY AND WIND TURBINES
Physics 302, Fall 2003, 8/25 to 12/5
Instructor: Dr. Vaughn Nelson

Course Information:
http://wtonline.wtamu.edu/schedule/courseinfo.php?courseid=149
Can be taken for college credit, continuing education ($500), or certificate ($400).

Registration information:
https://www.wtamu.edu/administrative/vpa/ce/courses/physics302.html

Course Description:
Introductory course with some math, calculations and use of spread sheet. At the end of the course you should be able to understand energy and power as it relates to wind resource and wind turbine energy production; be able to measure (instrumentation) wind parameters and analyze data; understand operational parameters of wind turbines (mechanical, electrical, control); size systems and predict performance; understand institutional issues: local, environmental, and national; calculate economic values from simple payback to life cycle costs.

SOLAR ENERGY
Physics 301, Spring 2004,1/13 to 5/3
Instructor: Dr. Vaughn Nelson

Course Description:
Introductory course with some math, calculations and use of spread sheet. At the end of the course you should be able to calculate consumption and lifetimes of energy resources; compare advantages and disadvantages of different renewable energy systems; calculate heat gain and loss for a residential structure (passive, active solar); calculate electricity produced by PV and wind systems (month, annual); understand institutional issues: local, environmental, and national; calculate economic values from simple payback to life cycle costs.

Membership Form

Name: _____

Affiliation: _____

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City: _____ State: _____ Zip: _____

Home phone: _____ Work phone: _____

Fax: _____ E-mail address: _____

Other organizations to which you belong (check or write-in all that apply)
☐ ASES ☐ TREIA ☐ TXSEIA ☐ AWEA ☐ SEED ☐ Sierra Club

How can you help promote clean energy? (check or write-in all that apply)
☐ Attend informal discussions ☐ Staff educational booth
☐ Help w/ solar car races ☐ Write articles ☐ Make presentations
☐ Conference volunteer ☐ Contact your utility/legislators

Annual Dues

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☐ $15 (student or EPSEA member)
☐ $25 (minimum regular member)
☐ $50 ☐ $100* ☐ $200*
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*recognized in quarterly newsletter

Business Membership:
☐ $100 ☐ $250 ☐ $500**
**includes ad in quarterly newsletter

ASES Membership:
☐ $65 discounted American Solar Energy Society membership for current TXSES members

School Fund:
☐ $25 Check here to contribute an additional $25 to the TXSES school fund.
This money is dedicated to support renewable energy projects in Texas classrooms.

Total due: $ _____ Make check payable to: TXSES
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Texas Solar Energy Society wishes to thank the following members who have supported us with $100, $200 and $300 level memberships:

John Carson, Randy Combs, Gary Covington, Tom Fitzpatrick, Robert Foster, Terese Hershey, Mike Landrus, Jane Pulaski, Lorin Vant-Hull, Paul Weatherall, Chuck Wright

The following companies have chosen to support the Texas Solar Energy Society's educational mission by joining at the business level:

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Department of Aviation, Baylor University, Waco, Max Schuck
Fresh Living, Air Water, Boerne, Victoria Braddock, vjbb@awesomenet.net
Hill Community College, Cleburne, Dave Gardner, dgardner@hill-college.cc.tx.us
Green Mountain Energy, Austin, Terri Eaton, terri.eaton@greenmountain.com
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And special thanks and kudos to the following business for joining at the higher Business level of support:

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The Texas Solar Energy Society (TXSES) was founded in 1976 and is a non-profit educational organization formed to increase the awareness of the potential of solar and other renewable energy applications and to promote the wise use of these sustainable and non-polluting resources.

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The SOLAR REFLECTOR

FALL 2003

promoting the wise use of sustainable and non-polluting resources

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Visit our web site for a calendar of events:
www.txses.org

Green Building: Leapfrogging the First Cost Barrier

There are multitudinous ways to improve the greenness or sustainability of a project, but considerably fewer ways to improve project sustainability without increasing first cost. One of the most significant barriers to creating sustainable facilities is designing projects that meet sustainability requirements without costing more than the owner can afford – the so-called first cost barrier. The challenge for you as an owner, architect, engineer, builder, or project manager is to find sustainable solutions that meet the occupant's needs for a facility, don't damage ecosystems or deplete resource bases, and don't cost more than a traditional project would cost. How can you find ways in your projects to leapfrog the first cost barrier to sustainable construction?

A variety of approaches have been tested in projects around the world to reduce the cost of building green, including increasing the efficiency with which we build and operate facilities and by avoiding costs that are traditionally associated with construction projects. To successfully green your projects without breaking your budget, there are six basic strategies to consider: solving the right problem; integrated design and right-sizing; dematerialization (the substitution of services to meet needs that were traditionally met by the purchase of goods); free resources; holistic cost management—counting all the costs; long term advantages from external influences. Given the space constraints here, this article will look at only one in more detail. I will cover all six at The Roundup!

Integrated Design and Right-sizing

The first strategy for greening your project within a limited budget is to make sure you're solving the right problem in the first place. This means questioning the question, "how can I pay for a new building?" and asking yourself if there might be more cost-effective and sustainable ways to meet your needs than constructing a new facility.

Once you've settled on a way to frame your problem that affords a broader perspective on how to meet your needs, the next step is to use an integrated design process to come up with an optimized solution. Integrated design is a term used in two fundamental ways in the building industry – first, it refers to integration of the design team to include stakeholders not traditionally included in the process, such as constructors, future building occupants, and community stakeholders. These stakeholders contribute to the design process in many ways, ranging from identifying potential constructability problems that could lead to construction change orders, delays, or disputes, to pointing out issues that will be critical for achieving buy-in and reducing potential implementation barriers.

Second, integrated design refers to a design process in which systems are developed in concert with one another rather than independently, and interrelationships between systems are exploited to optimize system performance and maximize cost savings. For instance, integrated design means that larger areas of high performance windows might be included as part of the building envelope design to provide for daylighting (raising total project cost), but the benefits of better envelope performance and reduced heat load from light fixtures are recouped by reducing the capacity of the building cooling system (lowering total project cost). Additionally, a smaller HVAC system might mean smaller pumps, fans, and motors, reduced duct sizes, smaller plenums, and reduced floor to floor height, also

continued on pg 2

Chairman's Corner

with Jaya Pichumani Jackson

As the summer draws to a close, TXSES has many solar-related events to look back upon and more to look forward to in the fall.

Many of you know that our national solar organization, the American Solar Energy Society, held its annual conference in Austin this past June. This conference brought hundreds of individuals in the solar field to the Lone Star state for workshops, tours (both TXSES activities) and seminars in passive and active solar energy. One of the most successful workshops was the Women's PV Design and Installation course in which 37 women from around the country spent 5 days learning about photovoltaics and installing a 2.5 kW grid-connected PV system on the Austin Youth Hostel. It was an inspiring gathering for the attendees, instructors and TXSES organizers, and enough interest was generated to continue offering such a workshop in the future.

TXSES was also a sponsor for a few other summertime activities around the state. The Winston School of Dallas held its annual Winston Solar Challenge, in which cars built by five high schools competed in a 9-day race from Round Rock to Cocoa, Florida. The TEED (TX Energy Education Development) camp was held in Abilene, allowing high school students to learn about energy through hands-on activities. And Texas Southern University in Houston held its 8th annual REEP (Renewable Energy and Environmental Protection) Academy for minority high school students, encouraging them to pursue academic careers in science and technology by introducing them to topics in renewable energy and environmental sustainability. These events are just examples of the excellent opportunities that are available to Texas youths and remind us of the importance of having such programs to ensure that the future of solar remains bright.

Looking to the near future, TXSES members can take advantage of another great opportunity to further their knowledge about sustainability and renewable energy as well as network with those involved in the field. The 4th annual Renewable Energy Roundup & Green Living Fair will bring vendors, educators and those who are currently living sustainable lifestyles to the public. This issue of the *Solar Reflector* highlights the keynote speakers who, along with tent-talks and exhibitors, will provide the latest information on all our favorite topics, with the addition of many new ones. We look forward to seeing each of you in Fredericksburg this September.

Texas is fortunate to have so many opportunities to enrich our knowledge base regarding solar and other renewable energies, which can serve as a reminder that Texas really does lead the nation in renewable energy potential.

Jaya Pichumani Jackson is the Engineering Manager in the Advanced Energy Division of CSG Services.

Leapfrogging con't.

reducing the cost of the facility. The net increase in the total first cost of the project may be negligible if the benefits afforded by one system are captured in the design of complementary systems. More importantly, life cycle cost savings can be considerable with these more efficiently designed systems, particularly if HVAC systems are right-sized for the facility, allowing them to operate at maximum efficiency over the life cycle of the facility.

Sustainability is becoming an important consideration for construction projects around the world. Sustainability offers a way of meeting the needs for which we construct projects, while avoiding the negative impacts traditionally caused by those projects. The ultimate goal of sustainability is our long term survival as the human race. The negative impacts of our present methods of construction can no longer be denied. The time has come to seek better ways of building that will maintain our quality of life and ensure that our children and their children can continue to live as well as we do.

Thinking strategically about how we go about greening our projects can ensure that we are able to meet sustainability goals without breaking the project budget.

Dr. Annie Pearce is the Director of the Sustainable Facilities and Infrastructure Program at Georgia Tech Research Institute and a founder and principal of the Urban Genesis Institute, a for-profit organization dedicated to urban revitalization through sustainable technology. She has been involved with sustainable design as a teacher and researcher for over ten years and has worked as a professional trainer and researcher across the US and abroad.

Recommended Resources

www.fundinggreenbuildings.com
this site is the home of an especially useful guide to funding sources for green building-related initiatives: the Energywise Directory. This binder of information, available for order from the site, has been compiled to include links, contact information, and descriptions of hundreds of relevant grant and technical assistance program. Purchasers of the directory can attend Funding Green Buildings workshops at reduced cost, and receive a periodic electronic newsletter high-lighting specific funding and technical assistance programs and providing periodic updates to the Directory.

www.sustainable.doe.gov/financing/grants.shtml
this site, the Center of Excellence for Sustainable Development, shows a variety of links to different organizations and foundations to help communities fund sustainable development projects. It outlines sources of information for Federal, private foundation, and corporate grant opportunities.

www.buildinggreen.com/features/lc/low_cost.html
this article from Environmental Building News is a classic source of information on no-cost, low-cost solutions for sustainable construction. Explore the options in this article if first cost presents a major barrier for your project. Classifies recommendations by building feature and type. Also, be sure to investigate the other excellent resources available on the BuildingGreen site.

www.naturalcapitalism.com
The online version of the revolutionary book Natural Capitalism, which describes how to design sustainable projects that are economically viable.

www.greendesign.net
An online directory of initiatives and organizations involved with green or sustainable design around the world. Also includes descriptions of many useful references for sustainable design.

www.greenbiz.com
this is the comprehensive resource site for green business. Contains case studies, resources, and excellent articles on how to be green and competitive in business practice.

www.greenguide.com
home of the Green Building Resource Guide, the most comprehensive resource on green building products with pricing information. The Guide is available as an online subscription or in print form, and contains product descriptions and manufacturer contact information along with a price index that shows the cost of the green product with reference to an equivalent traditional product.

COME HEAR ANNIE DELIVER A KEYNOTE ADDRESS,
"LEAPFROGGING THE FIRST COST BARRIER TO GREEN BUILDING,"
AT THE ROUNDUP ON SUNDAY, SEPTEMBER 28, FROM NOON – 1 P.M.

Fun in the Sun

I never knew the broiling Texas sun could feel so good! There I was, sweat pouring down my face, as I tightened the chuck on the DeWalt drill I had nicknamed Hercules. I was about to drill holes into the brick wall to attach straps that would hold conduit in place where we had run our electrical wires from the newly installed PV array. I was one of thirty women participating in a week-long Women's PV Design and Installation Workshop, sponsored by TXSES and ASES, installing a PV array on the roof of the Austin Youth Hostel and connecting it to the grid. I was sweating buckets in the 97+ degree heat, and having an absolute blast!

We had three inspirational women teachers who are professionals in the PV field – Marlene Brown and Deby Tewa from Sandia National Labs in New Mexico, and Janet Hughes, owner of Janet's Electric here in Austin. The workshop included three days of classroom instruction covering the basics of electricity; solar site analysis, PV system components, component specification and electrical wiring. This was combined with hands-on labs outside where we practiced what we covered in the classroom, and learned to work in small groups as a team. Then we had two days where we actually installed the PV arrays on the roof, and connected all the wiring and other components of the system, tying it into the existing electric grid at the hostel.

Not knowing the difference between a watt and an amp, or what DC vs. AC current was, this workshop seemed like the perfect place for me to learn about something I've had an interest in for a long time – namely, renewable energy, and photovoltaics in particular. I decided to take a vacation from my office job and stay at the hostel so that I could immerse myself in the experience, and I'm so glad that I did. Spending the week learning with and working alongside so many wonderful women from all over the country was an awesome experience! There were women of all ages, and all levels of experience. Some had never used power tools, and some sure weren't used to the intensity of the Texas heat. But everyone jumped in, teamed up and challenged themselves, and guess what – we got it done! I learned so much about PV and how it all works, not to mention just the basics of electricity. Being able to get up on the roof and install an entire system, from start to finish, felt like quite an accomplishment.

If you're interested in PV, or just want to get down and dirty with electricity, I recommend you keep your eyes open for any upcoming seminars taught by these knowledgeable women. The camaraderie, the exhilaration of working hard and accomplishing a difficult task, the fun and challenges of working as a team, and the feeling of empowerment that came with that accomplishment is something I'll never forget. And it was definitely the most fun I've had in the blazing Texas sun in a long, long time!

Linda Brown is a founding member of the Straw Bale Association of Texas and has had an interest in renewable energy and sustainable building for the last 10 years or so. She is a stained glass artist and plans to build a straw bale glass studio with hopes of incorporating solar energy in that project.

Water Plunder, Par for the Course

Call me crazy. Call me mad. But I get tired of being made to feel guilty for watering my garden on a dry July day. After all, my garden, as well as your garden, may need a little water from time-to-time, but they make up for it by producing food, beauty and oxygen.

I do not think there is a group of folks who care more about the environment and work harder to conserve water than gardeners. We mulch, plant native and adapted plants and use drip irrigation all in an effort to conserve water, our most precious natural resource (some folks think that petroleum is, but have you ever drank a glass of oil or taken a bath in gasoline?).

Yet we are persecuted for using water in our landscapes. The talking heads on TV scold us often during dry times about our wasteful ways. And, I am sure some of you have even been "busted" by the water cops for watering outside the proper time slots or on odd instead of even days. Or better yet, with a sprinkler instead of by hand (as if hand watering is inherently less wasteful).

What really burns me up is that on those days when non-essential water use is supposed to be curtailed car washes and golf courses are exempted. What is happening to our world when raising food or producing oxygen for folks to breath is non-essential but washing the dust off of vehicles or driving around in an electric car, drinking beer and hitting a little white ball in a circle are essential?

I guess I should let the car washes off the hook. After all, their busy season is during the wet part of the year when water conservation is not as big an issue. Not so when it comes to golf courses. When they are built they sink a huge pipe into a lake or aquifer. Then when they are developed they pump and plunder the water right through the summer, right through a drought.

According to a recent article by the *National Geographic Traveler*, each of the nations'16,000 golf courses, on average, use enough water to supply a town of 8,000 people. That is enough water for 128,000,000 people, half of the US population. And this does not take into consideration the 350 plus golf courses that open each year. If that is not enough, it is estimated that golf courses apply up to seven times as much pesticide as is applied to other crops.

I am sure that many of you are golfers as well as gardeners. Rest assured that I have nothing against the sport of golf, itself, or those who play it. My gripe is with the courses that thumb their noses at water conservation and pump and plunder while we conserve and get by.

It makes you wonder whether we really have a water crisis or a crisis of priorities.

Until next time, great gardening.

Chris Corby is an avid gardener and journalist who founded Texas Gardener *magazine 22 years ago and currently serves as its Editor/Publisher.*

Learn how to significantly reduce your landscape water needs and eliminate the use of toxic chemicals altogether while increasing the beauty of your landscape.

**COME HEAR CHRIS DELIVER A KEYNOTE ADDRESS,
"GARDENING OUTSIDE THE BOX,"
AT THE ROUNDUP ON FRIDAY, SEPTEMBER 26TH, 1 – 2 P.M.**

TXSES hosts first SUNRUN during Solar 2003.

About 35 runners enjoyed Town Lake early on Wednesday morning during the annual conference. Committee members, Tom Fitzpatrick, Steve Wiese, Gavin Moore, Katie Jenson and Melanie Fitzpatrick, are continuing to work toward establishing the event as an annual Austin 5K run on the summer solstice.

sun run 03

GEEK SPEAK

with Chuck Wright

About Sunlight

What is it? The true answer is that we don't really know. We have some mathematical models that do a very good job of explaining what it does, and of course, everyone has some pretty intuitive ideas about it as well, but that is about it. Fortunately, understanding how it behaves is quite enough to do some pretty wonderful things with the stuff.

To understand how light works, scientists do experiments with it, and depending on the type of experiment one does, light behaves like a wave or a particle (a photon).

As a wave, we can consider light to be part of the electromagnetic spectrum, like very very high frequency (or short wavelength) radio waves. We perceive light of different frequencies as having different colors. Sunlight contains certain frequencies that we cannot see, too. The infrared portion of sunlight is lower frequency than the visible light that we see, and actually contains about half of the energy that we receive
(certain modern windows and roofing materials take advantage of this fact to good advantage, by the way). The ultraviolet sunlight is also interesting, known to inflict skin damage. In terms of energy content, though, the ultraviolet only represents about one percent of the total in sunlight.

Sunlight can be used to drive chemical reactions. The reaction that we benefit from daily is photosynthesis, which plants use to drive the extraction of carbon from the air. Without this, there would be no life on Earth, at least as we know it. On average, by the way, plants tend to be fairly inefficient converters of solar energy, storing only about a tenth of a percent of the incoming sunlight energy as biomass.

Two other common ways of using sunlight are to generate electricity and to heat objects. In explaining a photovoltaic cell, the particle model of light is helpful. A photon zings in and is absorbed in the semiconductor material, raising an electron to a higher energy state. If things go right, this contributes to an electric potential across the PN junction of the cell. If things don't go right (and this happens quite a lot), the free electron just jumps back down to a lower energy level, and heat results (PV cells are actually more effective at collecting heat than they are at making electricity, but most are not made so that we can utilize that heat), which brings us to our other way of using sunlight, to heat objects.

Anything dark will be warmed by sun, and if you put that dark thing in a box with a glass cover, it can get very hot indeed. By playing around with the spectral characteristics of materials and the designs of collectors, solar engineers can make very efficient solar thermal collectors (often used to heat water). And we all know that solar heat can be utilized without collectors in a "passive solar" building that orients its windows properly and follows certain other design practices that understand the way that the winter sun is low in the sky while the summer sun is high in the sky.

In some applications, higher temperature is required. This is most often accomplished by use of curved mirrors that focus light onto a single spot. Solar furnaces have been built that achieve temperatures of several thousand degrees F. Many people have the notion that concentrating sunlight somehow increases the amount of energy being received. This is NOT correct. Concentrating collectors simply concentrate a given amount of solar energy into a smaller area, so that temperature is increased over that smaller area, but overall, there is no amplification of energy. In most cases, concentration is only a good idea if higher temperatures are actually required.

The total amount of energy that arrives at the surface of the Earth as sunlight is vast, dwarfing the total energy consumption of the human race. Still, the density of this energy is relatively low. A square meter of full sunlight carries about 1000 watts (a small space heater or a blow dryer). This hurts the economics of using sunlight, because fairly large areas are required to collect significant amounts of energy, though I argue that a complete economic analysis, considering all costs of energy sources, favors the use of solar energy.

Still, it is generally more convenient to find a source of energy that Mother Nature has already converted from solar energy and concentrated for us (wood, oil, coal, gas) and chop it down or dig it up, and then burn it.

Of course, the other advantage of using one of the concentrated forms is that you can burn them whenever you want. Because sunlight is available when it is available, technologies that use it must generally provide energy storage of some sort. The down sides of cutting, digging, drilling, and burning are well known, but are usually ignored in economic comparisons of energy sources.

Next time you think of a solar application, go back to the basics of sunlight. Really understanding how it works can make the difference between a solar application that works and one that doesn't.

Chuck Wright is a former TXSES Chairman and Microprocessor designer. Chuck is an independent renewable energy consultant

ASES in Pictures

photos by Judy Pearson

Participants in Women's PV workshop *Under the tutelage of Janet Hughes of Janet's Electric, women are busy wiring some of the 36 - SP75 Shell/Siemens panels in the 2.5kW system installed at the International Youth Hostel, Austin.*

Women learn wiring techniques *While classmates were on the roof, other workshop participants were installing the SMA 2500 Sunny Boy inverter for the grid-connected system. All the equipment was donated by Austin Energy.*

An unsuspecting former TXSES Chair *Chuck Wright and the, ah, "Ladies" at Esther's Follies, one of the special evening events put on by the LOC.*

TXSES Board member, Dr. Gary C. Vliet, is congratulated on his winning the Hoyt Clarke Hottle Award during Solar 2003 *It was an especially proud moment for Texas when one of our own was presented with the Hottle Award. Dr. Vliet has been involved with solar energy research for decades. He is a Professor of Engineering at UT Austin, where he serves as faculty, advisor and mentor to many of today's renewable energy advocates.*