Renewable Chatter

with The Solar Guy

Dear Solar Guy,

The other day I picked up a wrench that was lying in the sun, and it burned my hand. The wrench is very shiny, so I know that it reflects the sun. If it reflects the sun, why does it get so hot?

Ray Caliente, Shiner, TX.

Dear Ray,

Our sense of temperature is not absolute, as it depends on the type of material touched. Consider two materials of the same true temperature. If our finger comes in contact with a metal and a non-metal such as plastic, the metal will feel hotter. This is because the metal's high thermal conductivity readily draws heat from its interior to the surface, and it therefore feels hot. If one were to do the same thing with plastic, the surface in contact with our finger cools off to a temperature between its true (interior) temperature and that of our finger, since it has a much lower thermal conductivity than the metal. We sense the temperature as not so hot as the metal. However, if we were to use a thermometer and let it come to equilibrium, it would sense the true temperatures and confirm them to be the same.

It is true that clean metals are shiny and tend to reflect the sun's rays fairly effectively. Well-polished stainless steel has a solar reflectance of about 60%. A typical clean metal may have a reflectance of 40-50%; so about half is reflected and half absorbed. Thus, it still absorbs significant radiation. A black garden hose on the other hand will reflect about 10% and absorb about 90% of incident solar radiation. Yet if we touch the two, the metal feels hotter, even though it is cooler.

I guess the best analogy to this is the shower room floor. We know that if we have a tile floor, we go buy a rug ... not a stainless steel mat. They will be the same temperature, but the rug sure is a lot more comfortable.

The Solar Guy.

The Solar Guy is really Dr. Gary Vliet, Professor of Mechanical Engineering at UT-Austin.

Membership Form

Name: _____

Affiliation: _____

Address: _____

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

Individual Membership:
☐ $15 (student or EPSEA member)
☐ $25 (minimum regular member)
☐ $50 ☐ $100* ☐ $200*
☐ $300 Patron*
*recognized in quarterly newsletter

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

ASES Membership:
☐ $55 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
PO Box 1447
Austin, TX 78767-1447

Texas Solar Energy Society wishes to thank the following members who have supported us with $100, $200 and $300 level memberships:
Col. John Lee Carson, Jonathan Clemens, Randy Combs, Robert Foster, Terese Hershey, John Hoffner, Michael Landrus, Andrew McCalla, Jane Pulaski, Steve Wiese, Chuck Wright

TEXAS SOLAR FOR SCHOOLS

The first of 11 new installations of PV on schools was completed in October. The grid-tied system was installed at Maplewood Elementary in Austin and is rated at 1.8 kW DC. Conservation Services Group (CSG) worked with TXSES members, **Austin Energy**, which donated solar modules and an inverter, **Andrew McCalla** of **Meridian Energy Systems** and **Janet Hughs** of Janet's Electric, to do the installation. The school will also receive computer software that enables real-time monitoring and historical logging of system performance.

Maplewood received the system through participation in the Texas Solar for Schools program funded by the State Energy Conservation Office. CSG's renewables division, consisting of TXSES members **John Hoffner, Jaya Pichumani** and **Steve Wiese**, is the prime contractor installing grid-connected systems at 11 schools throughout the state.

In November, CSG will be installing similar systems at Brookesmith (near Brownwood), Ira (near Snyder), Hamlin (near Abilene), and Holliday (near Wichita Falls).

One of eleven PV systems being installed at Texas schools SECO, CSG, Austin Energy and Meridian Energy Systems team up to install this 1.8 kW system at Austin's Maplewood Elementary. The system consists of 24 Siemens SP75 PV modules, an Omnion 2400 Series 3.3 kW inverter, DC and AC disconnects, a kilowatt-hour meter and data acquisition equipment that logs the system's performance.

photos by Jaya Pichumai and Andrew McCalla

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.

Texas Solar Energy Society
PO Box 1447 • Austin, TX 78767-1447
Kathryn Houser, *Director*
Phone: (512) 326-3391 or
(800) 465-5049
Fax: (512) 326-1785
E-mail: info@txses.org

Visit our web site at:
www.txses.org

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Texas Solar Energy Society, Inc.
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WINTER 2002

The SOLAR REFLECTOR

promoting the wise use of sustainable and non-polluting resources

2nd Annual Texas Renewable Energy Roundup

3-day Fair in Fredericksburg Well Attended

In case anyone thought last year's successful Roundup, Green Living and Sustainability Fair was a fluke, please take note. More than 4,500 visitors came through the gates the last weekend of September, proving once again that folks are vitally interested in learning practical applications of sustainability.

cover photos by Steve Weikal, WeikalMedia

Herb garden of organic plants for sale

Gizmos and information galore

And the many experts gathered in Fredericksburg in the disciplines of green building, organic growing and renewable energy brought information needed now more than ever. As one fair-goer put it, "You could get your hands on the latest and greatest gizmo for supplying independent electricity, cool air, hot air, compost, clean water, and just about anything else you can imagine related to clean, independent living." In addition to the

continued on pg 2

Renewables Being Promoted for Energy Security

In perhaps one of the only recognizable "benefits" to arise out of the September 11th tragedy, many strange bedfellows have come out in support of renewable energy as a means of advancing our national energy security. From *Mother Jones* to Bill Moyers' keynote address to the Environmental Grantmakers Association, Americans are making the case for reducing our reliance on Middle Eastern oil supply while simultaneously reducing the security risk to our electricity generation infrastructure. No one group has more succinctly summarized the multiple benefits of a renewable economy than the Union of Concerned Scientists. With their usual rigorous study, UCS has published the "Clean Energy Blueprint." The following are excerpts from the Executive Summary of that report.

"Can America develop a balanced portfolio of clean energy solutions that will stop wasting energy and also develop diverse, domestic energy supplies to increase energy security?

Can America develop an energy system that will save consumers money, provide security and jobs, and leave a heritage of clean air, clean water, and pristine wilderness?

Can the United States restore international good will and credibility by reducing carbon dioxide emissions that threaten to destabilize the global climate?

This report demonstrates that the answer to those questions is "Yes."

The Union of Concerned Scientists, with assistance from the American Council for an Energy-Efficient Economy and the Tellus Institute, investigates the costs and benefits of a Clean Energy Blueprint to promote diversity in energy production and energy conservation. We compare our results with the business-as-usual forecast of the US Energy Inform-ation Administration. That forecast underlies the administration's proposal, as part of a National Energy Policy, to develop 1,300 new power plants by 2020.

We find that the United States can

- meet at least 20 percent of its electricity needs by renewable energy sources–wind, biomass, geothermal, and solar–by 2020
- save consumers a total of $440 billion by 2020, with annual savings reaching $105 billion per year or $350 for a typical family
- reduce the use of natural gas by 31 percent and coal by nearly 60 percent compared to business as usual by 2020, and save more oil in 18 years than can be economically recovered from the Arctic National Wildlife Refuge in 60 years
- simultaneously avoid the need for 975 new power plants (300 megawatts each), retire 180 old coal plants (500 MW each), retire 14 existing nuclear plants (1,000 MW each), and reduce the need for hundreds of thousands of miles of new gas pipelines and electricity transmission lines
- reduce carbon dioxide emissions by two-thirds from business as usual by 2020, while also reducing harmful air emissions of sulfur dioxide and nitrogen oxides by more than 55 percent

What Is the Clean Energy Blueprint?

The Clean Energy Blueprint is a suite of policies to increase energy efficiency and renewable energy:

- A **renewable portfolio standard** would require utilities to increase non-hydropower renewable energy from about 2 percent today to 20 percent by 2020.
- A **public benefits fund** would be created by a 0.2 cent per kilowatt-hour (kWh) charge on electricity, equivalent to about $1 per month for a typical household. It would be used to match state programs for energy efficiency, renewable energy, research and development, and low-income customer protection.
- **Production tax credits** of 1.7 cents per kWh for renewable energy would be extended and expanded to cover all clean, nonhydro renewable resources, helping to level the playing field with fossil fuel and nuclear generation subsidies.
- **Net metering** would treat fairly those consumers who generate their own electricity with renewable energy systems by allowing them to feed surplus electricity back to the grid and spin their meters backward.
- **Research and development** spending on renewable energy and efficiency would increase 60 percent over three years to levels recommended by the president's committee of advisors on science and technology in 1997.
- **Combined heat and power:** Incentives would be provided and regulatory barriers removed for power plants that produce both electricity and useful heat at high efficiencies.
- **Improved efficiency standards:** National minimum efficiency standards would be established for a dozen products, generally to the level of good practices today. In addition, existing national standards would be revised to levels that are technically feasible and economically justified.
- **Enhanced building codes:** States would adopt model building codes established in 1999/2000, as well as new more advanced codes established by 2010.
- **Tax incentives** would promote efficiency improvements for buildings and equipment beyond minimum standards.
- **Industrial energy efficiency measures:** Industry would improve its efficiency by 1 to 2 percent per year through voluntary agreements, incentives, or national standards.

Our analysis uses the US Energy Information Administration's NEMS computer model. We based our business-as-usual scenario on *Annual Energy Outlook 2001* (EIA, 2000), the EIA's long-term forecast of US energy supply, demand, and prices. The UCS analysis removes the EIA' s artificial constraints on renewable energy growth, consistent with a recent analysis by the Interlaboratory Working Group, the five national laboratories that do energy research. Additional adjustments were made as necessary to update assumptions to use the most recent data available. Most importantly, the IWG examined a renewable portfolio standard of 7.5 percent by 2010. The Blueprint increases the standard to 10 percent by 2010 and extends it to 20 percent by 2020. In addition, it uses more advanced energy-efficiency measures developed by the American Council for an Energy-Efficient Economy.

The Clean Energy Blueprint Creates a More Diverse Energy Supply

Under business as usual, and under the administration's National Energy Policy, the United States needs to build at least 1,300 new power plants by 2020. Natural gas use would increase from 16 percent to 36 percent over that period, and coal use would increase by 21 percent. Renewable electricity (not including hydropower) would increase from 2 percent today to only 2.4 percent by 2020.

Under the Clean Energy Blueprint, total energy use would be 19 percent lower than business as usual by 2020 and only 5 percent higher than 2000 levels, due to increased energy efficiency in homes, offices, and factories. Natural gas use would be 31 percent less than business as usual by 2020. Oil use would be reduced by 5 percent, saving over 400 million barrels per year by 2020. More oil would be saved over the next 18 years than is

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Chairman's Corner

with Chuck Wright

Patriotism

These days, I look about and see American flags everywhere, and I reflect on what it means to be patriotic and how I can support our country.

As I ponder this, there is not the slightest doubt in my mind that the greatest single factor underlying our trouble in the Middle East (note that I say "our" trouble, not "the" trouble) is our energy habits. It is an undisputed fact that our 4.5% of the world's population consumes 26% of the oil that is extracted from the earth. If you do some math, you will see that on average each of us uses over 7 times as much oil as each non-American and for Texans, it is closer to 12 times. It is also a fact that we import over 60% of what we use, and that this percentage is growing. And, in the recent words of Randy Udall, the U.S. is the "Swiss cheese" of oil provinces. The likelihood of our reversing our decline in domestic oil extraction in any significant way is somewhere between "fat chance" and "slim chance."

Aside from an addiction to oil, we have little or no reason for a presence in the Middle East. Given the present situation, we have every reason to be there, and this reason will be increasing as the inevitable happens: oil production will decline in almost every part of the world outside of the Middle East, so remaining reserves will be concentrated in this most volatile area.

Here's another thought. More and more in the oil industry are subscribing to the view that within a decade or so, world production of oil will reach its all-time high, after which it will begin a relentless and irreversible decline. If you think that the political forces of the Middle East have us over a barrel now, just wait a while.

Back to patriotism. Flags are nice, but I want to do more than show solidarity. I want to do tangible things that help protect what I believe are the essential American values of freedom of thought, expression, and association. Is there more that I can do? If my beliefs about energy are correct, then the answer is clearly yes. The answer will offend some, because it conflicts with the different notion of America they worship, the America of: "Get our of our way, we do what we want."

My answer is to plot a course toward sustainability, self-reliance, and energy independence. It is to recognize that there is a single Earth, and that it has to be shared by all of its inhabitants. It is to use energy wisely, recognizing that oil is far too valuable to burn, and put our efforts into solutions that will last forever. It is to capture energy ourselves instead of getting it from someone on the other side of the world. It is also to exercise our responsibility to participate in our government, using our right of free speech to help define a responsible energy policy, instead of leaving it up to corporate interests.

How can you help? Here are just a few ideas of many. You can drive a fuel-efficient car. You can drive less by using public transportation, walking or riding a bicycle. You can teleconference in place of taking a business trip. You can reduce your home energy use by insulating, using compact fluorescent lights and a programmable thermostat, and using solar energy. You can buy electricity from a "green" provider. You can learn about sustainability and support elected officials who envision a sustainable future and will work for it, or educate those who have no vision. You can talk to people about sustainability and help them understand how important it is to our future.

And then, after you have done some of these things, wave your flag in the pride and satisfaction of having done something real that will help your country!

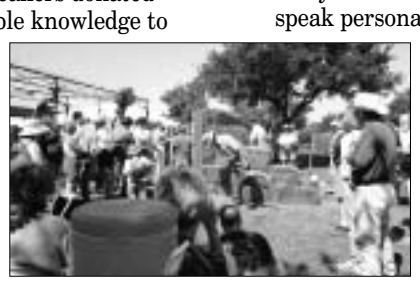
Chuck Wright is a consultant in microchip design and in renewable energy.

The Roundup Report Continued

A keynote speaker each day

many exhibits from industry and agencies, visitors were offered their choice of five hourly tent talks on the Marktplatz grounds. They could also choose from among 35 more in-depth workshops scattered throughout the city. Hundreds of speakers donated their time and valuable knowledge to support the cause of sustainability, and visitors responded with positive appreciation and a heightened sense of personal commitment. We extend our gratitude to each and every one.

The sustainability tour takes visitors to Bamberger Ranch



The Straw Bale Association of Texas teaches alternative construction methods

We added a few new elements to the Fair this year. Visiting classes of local school kids were given guided tours through the grounds and enjoyed making pizza box solar cookers. Young fair-goers were offered Just for Kids workshops as well, and 17 youngsters now have a solar powered model car of their own as well as a few wind powered cars and solar box ovens. In our ongoing effort to get renewable energy information into Texas classrooms, we also conducted workshops for teachers and introduced our Fact Sheets and Lesson Plans with hands-on activities.

Dr. Albert Bartlett explains the frightening facts about growth

Climate change science is clarified by Dr. Gerald North

Remote controlled Sunny the Robot

While Mom and Dad were learning about wind power, pesticide-free growing and building structures that use less energy, kids were entertained by Sunny the Robot, the renewable energy advocate who amazed everyone with his uncanny ability to speak personally to each person he met, and by rides in the recycled barrel train powered by biofuel. The Family Activities Tent once again provided other excellent opportunities for fun and learning.

The alternative vehicle ramuda gave adults hands-on opportunities to experience electric vehicles, velomobiles, hybrid cars, and flex-fueled cars and pick-ups. Knowing that these options do exist can greatly influence consumer choice, particularly in a market driven economy. Once again the Roundup made it possible for visitors to learn about alternatives to life-as-usual.

There is nothing usual about the dedication and commitment required to produce such an event, and kudos go out to all the Roundup Planning Committee members and Trail Bosses who spearheaded the efforts during the 12 months previous. Cindy Berry and Leslie Libby serenely kept the hundred plus volunteers organized and effective; Chris Crowe again graciously provided entertainment for our listening delight; Steve Wiese managed the activities for the little buckaroos with aplomb; Judy Pearson contributed many professional hours and miles to the graphics on all our printed pieces; Roy Holder kept the complexities of the grounds under control; and thanks to Tess Floyd the front gate operated with a professionalism that belied the all-volunteer quality of the staff. One other volunteer needs special recognition for his months of efforts and his ever ready supply of AV equipment organized to near scary perfection: Chuck Wright. Not only did Chuck arrange for and schedule every one of the speakers we were privileged to hear in all five tents and all the workshops, he also put in action his personal commitment to the cause by financially sponsoring some of our more well known speaker's travel expenses when our Roundup budget fell short.

Workshop participants race their own solar powered model cars

David Eggleston demonstrates his velomobile

Fredericksburg middle school classes visit the Roundup

The Roundup would not be the premiere showcase of renewable energy fairs in this country, as it has been called, without these many volunteers' contributions.

Alternative transportation is available now

photo by Steve Weikal, WeikalMedia

We are already planning next year's Roundup in Fredericksburg and hope to see you at the Fair September 20-22, 2002!

Natural Gardener, John Dromgoole

"Ecological Footprint" expert, Dr. Mathis Wackernagle

Rev. Sally Bingham of Episcopal Power and Light

economically recoverable from the Arctic National Wildlife Refuge over 60 years. Coal use would be reduced by nearly 60 percent.

Nonhydro renewable energy sources (wind, biomass, geothermal, and solar) would produce 20 percent of the nation's electricity by 2020. Energy efficiency measures would offset projected growth in electricity use. Combined heat and power plants would meet 39 percent of commercial and industrial electricity needs. Thus, the Clean Energy Blueprint would replace 975 of the 1,300 new power plants the National Energy Policy says we need by 2020, and retire 180 existing coal plants and 14 nuclear plants.

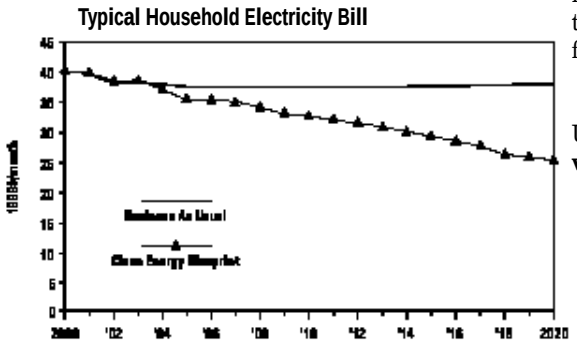
The Clean Energy Blueprint Saves Consumers Money

Under the Clean Energy Blueprint, net energy savings would grow to $105 billion per year by 2020, totaling $440 billion between 2002 and 2020. (Total savings between 2002 and 2020 are in 1999 dollars using a 5 percent real discount rate.) A typical family would save $350 per year in lower energy bills by 2020.

Monthly electricity bills for a typical household would decline from about $40 per month in 2000 to about $25 per month in 2020 under the Clean Energy Blueprint, as opposed to $38 per month under business as usual. Consumers spending these savings on goods and services other than energy would provide an important boost to the US economy.

The Blueprint's efficiency and renewable energy policies reduce natural gas prices by 27 percent by 2020, saving businesses and homes that use natural gas nearly $30 billion per year.

Typical Household Electricity Bill



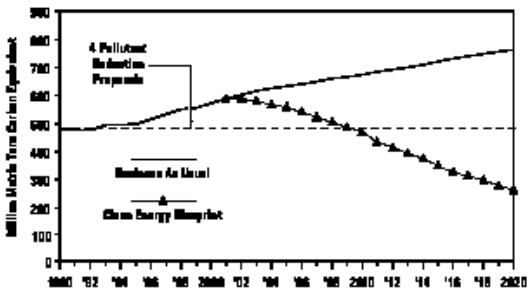
The business-as-usual scenario assumes a typical household uses 500 kWh/month on average.

Residential electricity use is 39 percent lower in 2020 under the Clean Energy Blueprint than business as usual due to energy efficiency measures. Savings presented do not include the cost of implementing the efficiency measures, but do reflect the impacts of slightly higher electricity prices than business as usual.

The Clean Energy Blueprint Reduces Damage to the Environment

The Clean Energy Blueprint would reduce power plant carbon emissions--which are heating up the earth and threaten to destabilize the climate--two-thirds by 2020 compared to business-as-usual projections. Sulfur dioxide emissions, which are the primary cause of acid rain, and nitrogen oxide emissions, a major cause of smog, would both be reduced more than 55 percent.

Power Plant Carbon Dioxide Emissions



The Clean Energy Blueprint would reduce the "need" to drill for natural gas and to build over 300,000 miles of new pipelines and 7,000 miles of new power lines, as called for in the administration's National Energy Policy. It would also reduce the need to mine, transport, and burn 750 million tons of coal per year by 2020 compared to business-as-usual projections. Moreover, energy efficiency and renewable energy can be increased faster than new fossil and nuclear energy supplies could be developed.

Energy efficiency and renewable energy technologies are ready to serve us. Now we need vision, leadership, and determination to provide a clean, affordable energy future."

The complete report is available at the Union of Concerned Scientists website: **www.uscusa.org/energy**

TXSES members ponder the meaning of it all at Roundup Reception (or are they just trying to figure out what was in that salmon cheesecake?)

Solar San Antonio

A new form of cooperation between governments and local agencies has been born in San Antonio. The Metropolitan Partnership for Energy has been created by the City of San Antonio, Bexar County and City Public Service. Joining these three founding members is the Alamo Area Council of Governments, VIA Metropolitan Transit Authority, the Greater Bexar County Council of Cities and Solar San Antonio.

The Metropolitan Energy Partnership is a nonprofit 501(c)(3) organization to facilitate and coordinate the Bexar County regional efforts to achieve energy conservation goals as outlined in the Texas legislature's Senate Bill 5 that requires political jurisdictions to conserve 5% electricity consumption for each of the next five years. To meet these goals, the Partnership will establish a Metropolitan Energy Office to execute policy decisions made by the members to achieve their energy conservation goals.

This is believed to be a first for the state of Texas with several jurisdictions, organizations and a nonprofit organization combining their efforts for the common good of energy conservation. Solar San Antonio took the lead in convincing the Partnership members an organization of this type would be less expensive to operate and assist each in achieving their energy conservation goals.

Future goals for the Energy Office will be a green building program, public education and facilitation of member initiatives to increase energy conservation throughout the region. The Energy Office is scheduled to be operational on January 1, 2002 and will have offices in downtown San Antonio.

Teacher's Corner

with Marge Wood

FREE is a word teachers really like. For you teachers who are eager to teach renewable energy but don't know much about it, take a look at **www.InfinitePower.org.** You will find a good series of 25 fact sheets and companion lesson plans that correlate activities to TEKS. Attendees at the November Conference for the Advancement of Science Teachers vacuumed up this information from our TXSES booth. The series provides packets for elementary, middle and high school levels. The best part is that it is all FREE. Another important aspect is that most of the lesson plans use inexpensive, common materials to do hands-on activities.

For example, the lesson plan on solar water heaters calls for experimenting with reflective and absorptive surfaces by building a small solar water heater made from toilet paper rolls, aluminum foil, aquarium tubing, and Styrofoam cups. At a recent teachers' workshop, those of us who made them learned that the longer the tube, the better. Curly drinking straws worked well, too, because they also slowed down the water flow. Spreading the tube out into a wider sun catcher worked better.

There are 22 other lesson plans, covering a wide variety of renewable energy topics all designed to make it easier to introduce alternative fuels into your classroom. So what are you waiting for? Get busy downloading all that information from **www.InfinitePower.org.**

Marge Wood is a Librarian and renewable energy educator in Austin and surrounding areas.

TXSES Board of Directors Needs You

At the end of December, 2001, Marge Woods, Andrew McCalla and Chuck Wright will all have fulfilled their maximum four years of service on the Board. We will particularly miss the passionate and wholehearted efforts of these three members and will be hard pressed to replace them. Additionally, Chuck is stepping down as Chair of the Board after putting in an incredible year of volunteer assistance, mostly unglamorous, behind the scenes labors that too frequently go unacknowledged. On behalf of the entire membership, I would like to express our gratitude to all three of these special renewable energy enthusiasts.

Becoming part of the team that guides the policies and directions of TXSES can be very rewarding. If you would like to serve as a Board member, please contact Kathryn Houser at the TXSES offices immediately. Nominations will be formalized at the final Board meeting of the year and ballots will be mailed out to the membership in early December.