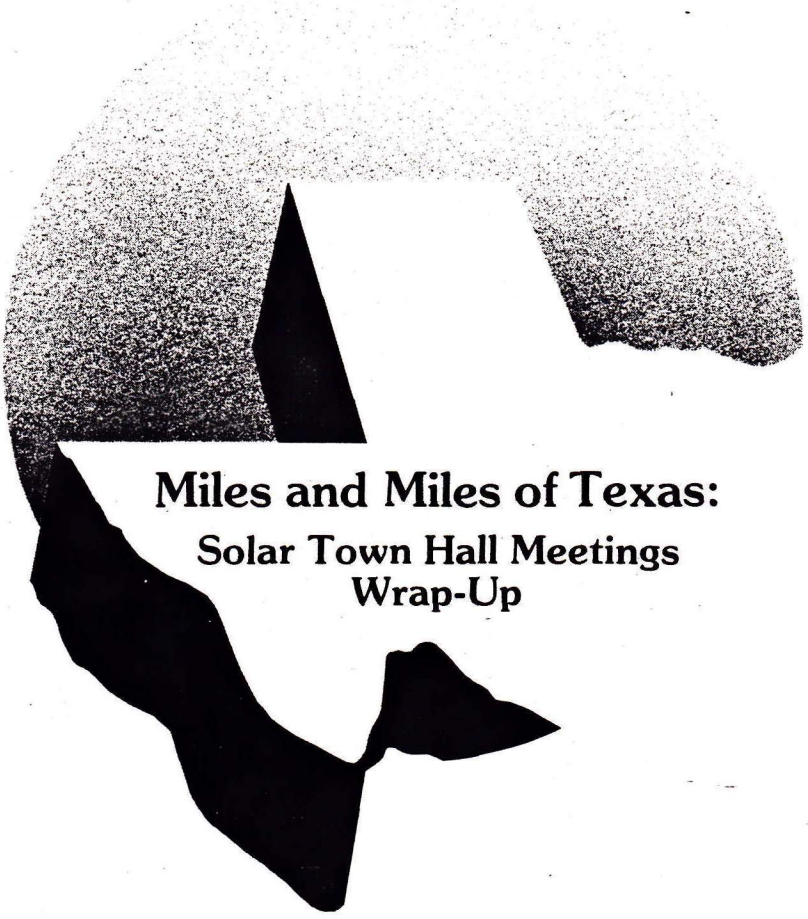
TX-SES NEWS

A PUBLICATION OF THE TEXAS SOLAR ENERGY SOCIETY

WINTER 1980-81 VOL. 4-04

A CHAPTER OF THE AMERICAN SECTION OF ISES 1007 SO. CONGRESS, SUITE 359 AUSTIN, TEXAS 78704



Miles and Miles of Texas:

Solar Town Hall Meetings Wrap-Up

* Solar Realities '81 Conference
* New Board Seated-Officers Elected
* CATCHING THE WIND

Watch for Special Solar Legislation Issue of SUNBURST in March

SOCIETY NEWS

New Board Seated-Officers Elected

The University of Houston Continuing Education Center was the site of the first TX-SES Board meeting of 1981 on Saturday, January 17. The first item of business was to seat the six newly elected members: Judi Basehore, Jack Howell, Isabel Miller, John Moore, Vaughn Nelson, and George Way. 1980 Chairman Gary Vliet conducted the election of officers for 1981. Those elected were: Chairman, George Way; Vice Chairman, Bill Burgesser; Secretary, John Moore; Treasurer, Gary Ashford.

Message from the Chairman

It is an honor that I have this opportunity to write an open letter to the membership of the Texas Solar Energy Society. I wish to begin by thanking several individuals for their tireless efforts on behalf of the Society over the past year. Gary Vliet, our 1980 Chairman, and Russel Smith, our Executive Director deserve special thanks for their continued leadership and commitment to our Society's efforts. The programs, which they helped foster to fruition during the past year, were of major importance in the public understanding of Solar Energy in the State of Texas. I would also like to thank Daryl Janes and Gary Beyer for their efforts in developing and managing two of the 1980 projects: The Texas Solar Townhall Meetings and the Solar Greenhouse Program, respectively. Together these two program reached several thousand individuals throughout the State on the subject of Solar Energy.

The Board of Directors recently completed the first Board meeting of 1981, and I am challenged and awed at the enthusiasm and dedication of our Board. As outlined at that Board meeting, many new and interesting projects of the Society lie ahead in the coming year. One of the first discussions of the Board was to establish a Planning Retreat, set for the last weekend in February. The purpose of this reatreat is to establish a clear set of goals and objectives for our Society in the coming years. If any member desires to have input into this planning meeting, please contact myself or the TX-SES office.

One of the major, anticipated projects is the planning and development of the 1982 Annual Conference of the American Section of the International Solar Energy Society, which we are hosting in Houston, Texas. This meeting offers our Society a real opportunity to display Texas hospitality to the National Solar Community and also to actively participate in the premiere solar meeting of the year. We have additional opportunity in that this meeting has been selected by the US Dept. of Commerce as one of 10 expositions in 1982 to have International Trade Fair Status. Three individuals from TX-SES have been nominated and selected to head this program. Anna Fay Friedlander has been selected as General Chair, Jack Howell has been selected as Technical Chair and Russel Smith has been selected as Conference Coordinator. This will be a major undertaking by our Society and is dependent on all of our individual efforts and support.

In closing, I would like to appeal to each member for support in the continued development of our Society. TX-SES is a vital link in not only the Texas Solar Community, but also in our country's efforts to understand nad develop a realistic and sound energy future. Unfortunately, many of the individual efforts of TX-SES go by unnoticed by the membership, but these efforts have a direct impact on the processes of change in our Society. TX-SES needs your support through continued membership and, of more importance, through participation, comment, criticism, or praise as you see it.

On behalf of the Board of Directors and myself, we look forward to the challenges of the coming year and appreciate your support.

George E. Way

SOLAR REALITIES CONFERENCE
March 16-17, Austin Hilton

The TENRAC Solar Realities Conference, contracted to TX-SES, promises to be an exciting one. Opportunities will abound to discuss with key officials a variety of important solar initiatives which are underway or have been recently mandated or completed at the state level, including the report and recommendations of the Solar Advisory Committee to TENRAC and the resulting legislation; the solar aspects of the RCS program; TENRAC solar information dissemination plans and the Energy Development Fund; and the PUC study on solar in Texas. Innovative local programs such as the City of Port Arthur Solar Orientation Code, Austin's Renewable Energy Development Plan, and El Paso Electric's "Hands On Solar Collector Construction Workshops" will be presented as well as several case studies and technical papers covering a variety of approaches to solar, wind and biomass. All told there will be 34 individual presentations.

The exhibits this year will go beyond the poster presentations of 1979 with a variety of hardware, models, and educational materials displayed by commercial and educational organizations from across the state. Once again there will be a Solar Film Festival with special screening times for conference registrants. Featured speaker at the banquet on Monday night, March 16, will be Ken Butti, co-author of the popular book "A Golden Thread". (See Book Review by Gary Ashford in Summer 1980 TX-SES News.)

The official announcement brochure with detailed program and registration information will be mailed mid February. The first Solar Realities Conference, in Dec. of '79, drew over 500 registrants and this one is expected to do as well. Early registration is recommended. The conference fees have been set at $20 advance, $25 at the door. The banquet is seperate at $15 per plate. For further information contact the TX-SES office or call John Carlson at TENRAC, 512/475-5407.

ETCE a TX-SES Success

With Dr. Clifford Laurence (U of H Energy Lab) as Session Chairman the TX-SES fulfilled its obligation in fine form as a co-sponsor of the 1980 ASME Energy Technology Conference & Exhibition, January 18-21 in Houston. Russel Smith reports above average attendance at both TX-SES sponsored technical sessions and a great deal of enthusiasm from the modest number of attendees at the exhibition. TX-SES invited the American Section of ISES to share booth space, with both groups making valuable contacts and gaining members as a result.

Papers presented in the TX-SES sponsored sessions are listed below, and are available from the TX-SES office for $4.00 ea. (non-members), $3.00 ea. (TX-SES members).

Steam Generation by Solar Central Receivers for Enhanced Oil Recovery
- J. Rogan, McDonnell Douglas Astronautics Corp., Huntington Beach, CA.

Solar Thermal Enhanced Oil Recovery
- B. Niemeyer, Acurex Solar Corp., Mountainview, CA.

Solar Thermal-Enhanced Oil Recovery System for Exxon's Edison Oil Field
- T. Oliver, Martin Marietta Aerospace Denver, Denver, CO.

United States Gypsum Plant Solar Retrofit
- D. K. Zimmerman, Boeing Engineering and Construction Co., Seattle, WA.

5MWe Solar Therma Electric Power at Crosbyton, The Texas Tech Solar Grid-iron Concept.
- J. R. Dunn, Texas Tech Univ., Lubbock, TX.

Design/Construction & Operation of a Low Pressure Solar Steam Facility
- C. Strong, Johnson & Johnson Co., Sherman, TX

Solar Industrial Retrofit System North Coles Levee Natural Gas Processing Plant
- R. L. Henry, Northrup, Inc. Hutchins, TX.

Central Receiver Solar Industrial Retrofit System for the Provident Energy Company Refinery
- R. Raghavan, Foster Wheeler Development Corp., Livingston, N.J.

DIRECTIONS

In a few weeks, Michael Millard, our CPA, should have the finishing touches put to our books for 1980. They are somewhat discouraging. Although we have been performing contract work for TENRAC, the basis of our compensation is reimbursement for direct costs and expenses. What this means is that, while the Society expanded its staff to four and one half for the duration of these contracts; direct services to the membership have suffered somewhat. The very positive effects of the two successful programs in 1980 do not negate the fact that our general financial condition must be improved.

Cost reimbursal contracts have forced us to borrow money for salaries, postage, and dozens of other expenses which must be paid. Even with this buffer, fairly severe cash flow problems have plagued us throughout the year; due in great part to lengthy delays in processing and payment of invoices to the State for work performed. These cash flow problems have resulted in accumulation of late payment charges and other penalties not covered in these contracts.

Reproduced here are our 1979 year-end Financial Statement (unaudited) and a summary of the Society's financial condition as of November 30, 1980. It will be late spring before all outstanding invoices for the 1980 state contracts have been cleared and the books closed outh. We do not expect to see any significant change in our status. You can see that we have incurred expenditures in excess of income in both FY 1979 and FY 1980 of around $2,000 for each year. Unless we can turn this around this year, we will exhaust our capital resources. We currently have a bank balance of $1,000 with outstanding accounts payable of $22,000. We are behind in one salary payment as much as five months and several fixed overhead items are due. Our cost of operation is running higher than our income from dues. Since almost all of our operation has been preoccupied with contract work for TENRAC, you might say that we are subsidizing their efforts, even if indirectly.

The opportunity for a meaningful solar information outreach program for the State does not appear to be in the cards if the current round of proposal requests is any indication. We will soon have our hands full with preparations for the 1982 AS of ISES Conference in Houston. Any program of Information Transfer or Technical Support is of necessity unbudgeted and will have to be supported from the General Fund. This year, revenue from the newsletter has been negligible. Book sales offer some hope, with the Active Systems manual now having paid for itself and beginning to provide revenue. Clearly, if the Society is to continue to be involved in providing large scale information dissemination services of some kind, new approaches to funding must be found. Having a full time office capability has meant much more to the progress of solar development in Texas than readily meets the eye. Its continuation is critical.

The core group of individuals who have been involved in past program efforts at the TX-SES office continue to explore possible avenues of support. Some part time money for services and overhead is being realized in relation to the TENRAC Solar Realities Conference. Russel Smith is currently negotiating a contract with AS of ISES for coordination of the '82 AS of ISES Annual Meeting, and a modest amount of overhead support money can be expected from that. The Society has always relied on a large degree of volunteerism. If we recognize the enormous task (and opportunity) ahead and apply the resources we have available, we can all benefit. Contribute what you can, we need you and your ideas.

Gary Ashford
Treasurer

Russel E. Smith
Exec. Dir.

BALANCE SHEET
TEXAS SOLAR ENERGY SOCIETY INC.
DECEMBER 31, 1979

(UNAUDITED)

ASSETS	
Cash in Bank	$ 3,921.77
Deposits	75.00
Accounts Receivable - State	945.14
Total Assets	$ 4,941.91
FUND BALANCES	
Fund Balance December 31, 1979	$ 4,941.91

SUN / ANGLES

New Affiliate Chapter

At its meeting on January 17, the TX-SES Board approved for affiliation the newly formed Panhandle Solar Energy Society (PANSES). The group was spawned by the high profie activities surrounding the Solar Greenhouse '80 and Solar Town Hall Meetings programs in Amarillo this past fall. Several solar enthusiasts who formerly felt isolated and singular fell in with that "Motley Crew from WTSU" (Vaughn, Earl, Meg, et.al.), and with the perseverance of Rick DeVoe pulled together quite an impressive group of charter members. Says Rick, who was, immediately elected President, "PANSES has secured a very nice meeting place which will be both permanent and free. The hosts are the grateful recipients of the (Solar Greenhouse '80) greenhouse (the Amarillo Children's Home). Other officers are: Bill Underwood, VP; Sara Sorelle, Sec.; Tommie De Voe, Treas. Contact PANSES c/o Rick DeVoe, 1222 S. Crockett, Amarillo, TX 79102, 806/355-6528.... Diane Weinberg, newsletter editor for the Dallas/Fort Worth Solar Energy Assoc. (DFWSEA) reports quite a stirring of interest in attached solar greenhouses in "the Metroplex". DFW Greenhouse Team members Jill Smith, Walt Kaesler, and Claude Thompson have all appeared or will soon appear on TV shows resulting on increased activity for the greenhouse workshop program. DFWSEA officers for '81 are: Robert McDermott, Pres; George Walters, VP; Barbara Burg, Sec.; Barbara Ekelman, Treas....

Continued on p.5

REVENUES AND EXPENDITURES (ACCURAL BASIS)
TEXAS SOLAR ENERGY SOCIETY INC.
FOR ELEVEN MONTHS ENDED NOVEMBER 30, 1980

(UNAUDITED)

	General Fund	GOER Project	Green House Project	Town Hall Project	Total
REVENUES:					
Membership Dues	$ 5,765.00	$	$	$	$ 5,765.00
Book Sales	3,054.81				3,054.81
Donations and Printout Sales	674.83				674.83
Miscellaneous	746.45				746.45
State Projects		39,174.57	98,496.63	66,872.48	204,543.68
CETA Program	928.26				928.26
Project Administration Fees	47,243.38				47,243.38
Workshop Fees	3,000.00	132.00			3,132.00
TOTAL	$61,412.73	$39,306.57	$98,496.63	$66,872.48	$266,088.41
EXPENDITURES:					
Project Management	$	$	$26,629.33	$21,004.61	$ 47,633.94
Technical Development			18,728.00	11,520.00	30,248.00
Presentation/Implementation Workshops	650.00	9,330.00	8,550.00	2,800.00	21,330.00
Travel	493.14	2,777.27	15,799.79	3,917.15	22,987.35
Materials Production	580.42		7,526.04	3,867.78	11,974.24
Promotion/Publicity	16.10		805.80	1,284.52	2,106.42
Comfrence Coordination				247.32	247.32
Dues and Subscriptions	656.00				656.00
Interest	1,013.14				1,013.14
Bookkeeping	2.95		60.25	78.20	141.40
Secretarial/Clerical	1,008.98		5,562.41	2,561.59	9,132.98
Postage and Mailing	1,227.15		686.91	990.74	2,904.80
Printing, Copying, Photos	5,276.97	2,315.90	587.56	158.97	8,339.38
Office Rental	1,340.00		1,020.00	2,115.00	4,475.00
Supplies	787.11	104.59	578.24	545.91	2,015.85
Telephone	1,821.96	226.73	1,275.74	1,545.17	4,869.60
Taxes	641.63	1,118.56	550.42	286.17	2,596.78
Professional		963.51		1,724.25	2,687.76
Meetings and Comfrences		7,256.39			7,256.39
Miscellaneous	360.57		80.00	35.00	475.57
Equipment Rental	263.94	14.21	620.97	943.84	1,842.96
Project Facility Rental			146.29	70.00	216.29
Lists	303.63			116.60	420.23
Advertising	146.00				146.00
Film and Development	10.90		454.00	121.00	585.90
Salaries	34,163.30	10,104.32			44,267.62
Workshop- GOER		6,040.23			6,040.23
Accrued/Unpaid Expenses	12,350.56		8,834.90	10,938.66	32,124.12
TOTAL	$63,114.45	$40,251.71	$98,496.63	$66,872.48	$268,735.27
NET Revenues (Expenditures)	$(1,701.72)	$ (945.14)	$ .00	$ .00	$ (2,646.86)

Announcements

NCAT RFPs

The National Center for Appropriate Technology has a number of grants available for demonstration projects in the field of appropriate technology. Awards will be made on the basis of competitively judged proposals submitted by eligible applicants. Summaries of the projects addressed are as follows:

RFP #42-1 Community Demonstration of Vertical Wall Solar Air Heaters (10 grants @ $3,500 each)

RFPs Available February 6, 1981
Submission Deadline May 1, 1981
Awards Announced During August, 1981

The purpose of these ten grants is to demonstrate Vertical Wall Solar Air Heaters in low-income communities. This grant will provide funds to each of the ten selected grantees to build at least one demonstration air heater on at least one low income residence. NCAT will provide with the RFP, information about this technology along with addresses to obtain detailed plans. If an applicant wishes to propose designs other than those NCAT suggests, it is welcome to do so. Experience in the field of solar energy is not necessary to compete for this grant. Carpentry experience is necessary.

RFP #42-UICD and 42-NICD
Urban and Non-Metropolitan Integrated Community Demonstrations (2 grants at $150,000 each)

NCAT is planning two integrated community demonstrations; one Urban and one Non-metropolitan. The purpose of these grants will be to demonstrate how the integration of appropriate technology adn community organizations can help meet the needs of low-income people in areas such as food, housing, energy, medical care, transportation, public services and employment.

Eligibility:

1. Legal contracts with NCAT are required because government grant funds are used for these projects. Funds are from the U.S. Community Services Administration (CSA)

2. Grants may be made to CSA funded Community Action Agencies (CAAs) or CAS funded Community Development Corporations (CDCs). Non-profit Corporations or Public Agencies which are not CSA funded CAAs or CDCs also may be eligible to receive a grant if the CAA or CDC with jurisdiction in the applicant's geographic area submits a letter with the proposal justifying that the applicant is preferable to the CAA or CDC for the successful carrying out of the proposed activity.

3. All responses to RFPs must contain the written endorsement of the Chief Adminstrative Officer of the applicant agency.

The Request for Proposals (RFP) and proper proposal forms can be obtained by writing:

NCAT Grants Office
P.O. Box 3838
Butte, Montana 59702 or by calling the Grants Office at:
406/494-4572.

NSF Programs

National Science Foundation is expanding its program that supports research in small science and high-technology firms. Program will feature many new areas of research and increased funding in the three-phase effort. Particular emphasis will be given to firms with strong research capabilities in science and engineering. Solicitation NSF 80-85 seeks research proposals in 22 scientific and advanced technology topic areas, including materials research, biosources of materials, advanced manufacturing processes and appropriate technology. Some 80 Phase I awards of $30,000 are planned, followed by Phase II awards averaging $200,000 for up to one half of those projects most promising after the first phase. Patent rights will be made available to the awardees subject to certain rights retained by the government. Program also includes funding to convert the research into commercially available products under a Phase III. Program is restricted to small businesses with 500 or fewer employees. Deadline for receipt of proposals of up to 20 pages is April 1. Contact: Forms and Publications Unit, NSF, 1800 G St., N.W., Washington, D.C. 20550.

AS of ISES Job

Position: Membership Director

Hiring Date: Immediately

Description: The Membership Director is responsible for developing membership promotion and retention programs. The Director must be able to sell memberships to prospective members through telephone, in person visits, written correspondence, and presentations to allied and counterpart groups. Responsibility also includes restructuring current membership categories, benefits and dues. The Director must develop printed materials, coordinate the production of an annual Membership Director and develop a yearly membership attitudes survey.

Benefits and Salary:

$14,000 to $17,000
Two weeks paid vacation, paid holidays and sick leave, comprehensive medical and life insurance plan, excellent pension plan (in place of social security), no state income tax, located on the campus of Central Texas College - staff have access to all campus facilities. The Society is a rapidly growing organization involved in the exciting and challenging energy field. It is located within one hour's drive of the State Capitol in Austin.

Application:

Please send resume and personal letter to:

Lee Salmon
AS of ISES
Central Texas College
West Highway 190
Killeen, TX 76541

AS of ISES is an Equal Opportunity Employer.

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AT Small Grants Program

The Dept. of Energy has announced Cycle 3 of its Appropriate Technology Small Grants Program. To be considered for financial support, projects must fall into one of the following categories:

Idea Development: Grants up to $10,000 for development of ideas ranging from new sources of energy to the use of old procedures or systems for a new application.

Device Development: Grants of up to $50,000 for the development of a concept into the design, assembly and laboratory scale test of a system or technique to determine its feasibility and potential use.

Demonstration: Grants up to $50,000 for applying a technological system or approach under real-life conditions to test its application for future use by individuals, cooperatives, municipalities, businesses, etc.

Approximately $800,000 is expected to be available for cycle 3 grants in Region VI. In the first two cycles conducted in Region VI, 116 awards were made ranging from $700 to $49,000 averaging $13,000 and totaling $1,516,852. For additional information and application forms write:
Appropriate Technology Program
U.S. Dept.of Energy/6CE
P.O. Box 35228
2626 W. Mockingbird Ln.
Dallas, TX 75235

New Book

Passive Solar Heating Design, by Ralph M. Lebens, 234 pp., Applied Science Publishers, London.

This book sets out to provide simple design methods for passive solar heating of buildings. The author is a London UK, architect consultant specializing in computer aided design. During 1977-78 he was at the Massachusetts Institute of Technology in the design and construction team for the MIT Solar 5 building.

After a brief introductory chapter contrasting the active approach with the passive approach, the various passive systems are classified and compared. The book has four chapters, the major portion being Chapter 3, "A workbook of passive solar design toos and logic". Three programs developed by the author for a TI-59 programmable calculator are mentioned, and user manual for them are given in three of the five appendices.

The Passive Simulation Program (PSP) is a finite difference thermal network program using up to seven nodes and calculates temperatures within the building or heating load to maintain a minimum thermostat temperature. It takes 30 minutes for a 24 hour-by-hour simulation. The second program is designed to investigate the likelihood of overheating occuring in spring or autumn and is known as Passive Design Program (PDPI) and determines the maximum room air temperature in an equator-facing direct heat gain space on a clear day at the equinoxes (21 March or 23 September). The third program is the Cost/Load Program. The heating load per month is estimated by a variable base degree day method in which the balance point temperature is used as the degree day base temperature, and is determined by an iterative process. Standard life-cycle costing methods are then used for cost benefit calculations.

The author deliberately attempts to "demystify the problems by avoiding useless complications such as the use of joules or gigajoules as measurements of energy rather than familiar units of watt-hours or kilowatt hours". It is a pity to see greater use of S.I. unit retarded by such an attitude and by the author's use of dual units throughout. Use of joule for energy and watt for power may have helped the author avoid a certain amount of confusion. Thus under nomeclature we find I (with various subscripts) used as a measure of (i) energy delivered per unit area (solar irradiation W.h/m^2) (ii) power or rate energy delivered per unit area (solar irradiance, W/m^2) and of energy for a given surface (solar irradiation, Wh). It would seem desirable to carefully distinguish these various quantities with different symbols and to refrain from using the descriptor 'hourly' for a quantity having units of W/m^2. While on the subject of units, there is some confusion about the meaning of MBtu. In this book it means 10^6 Btu but in U.S. Dept. of Energy literature it means 10^3 Btu. The former seems more logical but there should be unanimity on the matter.

Although much useful information is provided, there are some doubtful or misleading statements. On p.3 we find "Under overcast skies or intermittent sunshine an active system will shut down but a passive system continues collecting". While a concentrating collector my shut down, a flat plate collector could well continue collecting under overcast skies. In Fig. 2.2 on p.7 one wonders what the relevance of the moon is on a winter night. It seems strange on p.31 to see two different values of Reynolds Number depending on the units used. Being dimensionless the Reynolds Number should of course be the same in any coherent system of units. On p. 116 it is stated that "in terms of losses, the passive solar system operates for all 24 hours". Surely a good passive solar system depends on active householders who will ensure, in a direct gain situation for example, that the windows are insulated at night by drawing drapes or closing shutters.

Notwithstanding, these and other criticisms which could be made, this is an interesting book attempting to assist the design of passive solar homes with some simplified quantitative aids. The author has some criticisms of the Solar Load Ratio method developed by workers at the Los Angeles Scientific Laboratory and makes no mention of program DEROB which as been adopted by the U.S. Dept. of Energy as the Standard Evaluation Technique for passive solar houses.

E. R. Ballantyne
ISES News

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SUN ANGLES **Continued from p.3**

As usual the El Paso Solar Energy Association is taking aggressive action on several fronts. They recently voted to publically support the efforts of El Paso Electric in its proposed Solar Repowering Project, a view not evidently shared by the City Council. At the same time, EPSEA is working very closely with the city in a Solar Information Center effort to be headquartered in a Low Cost Solar Adobe Demonstration Home. The chapter will supply personnel on Saturdays and a phone for EPSEA will be installed there. They have also published an excellent booklet "Low Cost Attached Solar Greenhouse - for Southern and Southwestern Climates", while their Greenhouse team continues to build on the success of the Greenhouse '80 program. '81 officers of EPSEA are: Pres. Gary Ashe; V Pres. Carole Myre; Sec. Mike Cormier; Treas. Doyle Merritt... Our Coastal Bend cohorts in Corpus, the CBSES, have selected a new crew. Admitting it won't be easy to fill the considerable vacuum left when longtime TX-SES member and CBSES founder Gary Weed departed for Florida and a new job assignment, the new officers are: Chrm. Rick Vrooman, V.Chrm. Mick Boudreau; Treas. Virginia Fillingham; Sec. Clyde Lewis. They have gone right to work planning a May 2nd and 3rd Sun Day in conjunction with Buccaneer Days. Anyone interested in exhibit space should write CBSES, P.O. Box 1716, Corpus Christi, TX 78403.

SUSTAINING MEMBERS

ACUREX SOLAR CORPORATION
MOUNTAIN VIEW, CALIFORNIA

CENTENNIEL HOMES, INC.
DALLAS, TEXAS

ENERGY EXPLORATION GROUP
DEL RIO, TEXAS

PETROPHYSICS, INC.
HOUSTON, TEXAS

SOLAR SOUTHWEST
ODESSA, TEXAS

RAYMOND REED
COLLEGE STATION, TEXAS

SUNDIAL

Mar. 9-11

WASHINGTON, D.C. 8th Energy Technology Conference and Exposistion Contact: Martin Heavner, Gov. Inst., P.O. Box 5918, Washington, D.C. 20014.

Mar. 15-20

MIAMI, FL. International Passive Hybrid Cooling Conference Contact: Dr. David Nawrocki, Laurence Berkeley Lab, B67A, Berkeley, CA 94720.

Mar. 16-17

AUSTIN, TX. Solar Realities '81 Austin Hilton. Sponsored by TENRAC. (See article on p. 2) Contact: TX-SES 1007 So. Congress, #359, Austin, TX 78704, 512/443-2528.

Mar. 22-27

DENVER, CO. Solar Desalination Workshop, Contact: SERI, 1617 Cole Blvd., Golden, CO 80401, 303/231-7361.

Apr. 7-8

SAN FRANCISCO, CA. Solar Thermal Research in Advanced Development - Program Review. Contact: SERI, 1617 Cole Blvd., Golden, CO 80401, 303/231-7361.

April 29 - May 1

BRIGHTON, ENGLAND International Conference on Energy Storage, Bedford Hotel. Contact: BHRA Fluid Engrg. Energy Storage, Cranfield, Beds, MK 43 OAJ, England. Tel. Bedford (0234) 750422. Topics include: Low grade heat storage, pumped storage/tidal, underground compressed air/gas, electrical/chemical batteries, aquifer storage, flywheels.

May 26-30

PHILADELPHIA, PA Solar Rising - Annual Meeting of AS/ISES, Philadelphia Civic Center. Contact: AS/ISES, RIAT, US Hwy 190 West, Killeen, TX 76541.

June 8-10

KANSAS CITY, MO American Underground Space Association (AUA) Conference and Exposition. June 9th will be devoted to Earth Sheltered Bldgs. Contact: Thomas C. Atchison, AUA, Dept. of Civil and Mineral Engrg., 221 Church St., SE, Univ. of Minnesota, Minneapolis, MN 55455, 612/376-5580.

June 26-28

HOUSTON, TX. Energy Expo - To reserve exhibit space call 1-800-237-9564.

Aug. 14-20

Solar Adventure in Britain - A tour through Scotland and England that combines solar energy with historical sites. The tour is limited to about 30 persons and was planned with assistance from the Int'l Div. of SERI and the British Embassy in Washington. Contact: Roy Grundy, College of DuPage, Glen Ellyn, IL 60137, 312/858-2800, ext. 2088.

Aug. 23-28

BRIGHTON, ENGLAND International Solar Energy Society Congress Contact: June Morton, Congress Administrator, UK-ISES, 19 Abermarle St. London WIX 3HA, England. Tel. 01-493-6601.

RESOURCES

Wind Energy Resource Atlas: Volume 7- The South Central Region
PNL - 3195 WERA 7
The atlas should be available by March 1981 from:
U.S. Government Printing Office
Superintendent of Documents
Washington, DC 20402
509/376-4177

Classroom Solar Collector - A portable 2-sq.ft. demonstration solar collector which may be used conveniently within the classroom or outsie to demonstrate the basic principles of a passive flat-plate water collector. The collector box is durably constructed of sheet metal and includes insulation, absorber sheet with copper circulating pipe, and glazing. The plastic tubing and water storage container provided are used in the various experiments to study heat absorption, how the passive system operates and to measure heat gain in BTU's. $95. For complete catalog write: Crystal Productions, Airport Businces Ctr., Box 11480, Aspen, CO 81611 303/925-8160.

Solar Heating and Cooling of Residential Buildings - The 1980 edition of DOE's manuals on solar energy for homes. The manuals were prepared by the staff of the Solar Energy Applications Laboratory at Colorado State University with a national advisory committee made up of members of the home building industry, universities and government. Information is included ons selection, costs, testing, operation and maintenance of both liquid and air heating solar systems for combined space and water heating, and for water heating only. It also examines solar cooling methods and systems operations. The two volume set is available prepaid from the superintendent of documents, U.S. Government Printing Office, Washington D.C. 20402. They should be ordered by the titles and stock numbers: "Design of Systems", $12, S/N 003-011-00089-5; and "Sizing, Installation and Operation of Systems," $10, S/N 003-011-00088-7.

Matching Renewable Energy Systems to Village-Level Energy Needs SERI/TR-744-514 - Report provides international agencies and planners in developing countries with an analytical tool for determining the applicability of renewable energy sources to specific rural locations in developing countries. This paper describes a five-step planning procedure that can be used to match rural energy needs with the most appropriate technology. It includes detailed examples of the matching process for typical end-use applicatons in developing countries. A bibliography and tables complement the text. Authors: Asworth and Neuendorffer, 55pp., Microfiche $3.00. Printed copy $5.25.

Decentralized Energy Studies: Bibliography SERI/RR-744-448 - Offered in this publication is a compilation of literature on decentralized energy systems, arranged according to topic and geographical scale to facilitate quick reference to specific areas of interest. Also included are articles by and about Amory B. Lovins, periodicals, directories, and other bibliographies. Author: Ohi et al. 53pp., Microfiche: $3.00. Printed copies $5.25.

SERI reports may be obtained in microfiche and hardcover from the National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, VA 22161, as they become available. Prices listed are for NTIS unless otherwise noted. For SERI Document Distribution (DDS) request write to DDS, SERI, 1617 Cole Blvd., Golden CO 80401.

APPROPRIATE COMMUNITY TECHNOLOGY

ACT

bradley

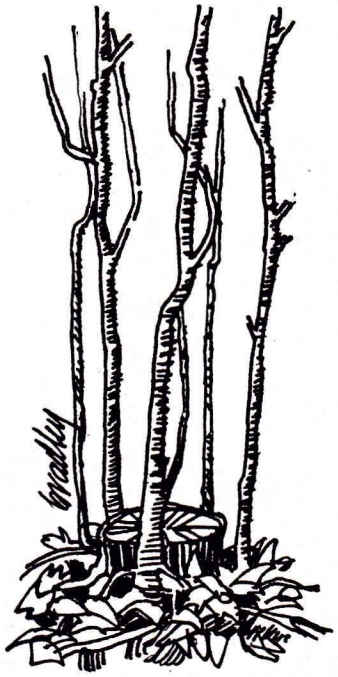
ACT

Coppicing

The following interview with Dr. Geoffrey Stanford took place in a rush at the Love Field Air Terminal early one morning in Dallas. We asked Dr. Stanford to tell us about his coppicing research. We did not interrupt.

Coppicing is taking a stand of decidious trees (not conifers), cutting them down to the gound and letting them sprout from the stump. It's really been practiced for at least 4,000 years in Europe, we know that, we've got evidence. And in those days they had no saws, everything was either an axe or what's called a "frowe", which is a means of splitting timber, so you would cut down this tree and then writhe it or split it with this frowe and you could use the writhings, the split woods, for planks or for weaving if you cut it thin enough. But clearly there were limitations on how big a tree you could split, so the whole technology was for relatively small trees. Larger trees were used for center posts or for roofing frames. There was a value not only in the large trees, but also in the small trees, and in the very small trees. Now the virtue of coppicing, let's say, in encouraging or husbanding small growth from the stump is that they grow dead slim, very close together, and therefore they grow very tall looking for light, and therefore grow long and thin and uniform. So you are left with "wands", is what it was called, like a bamboo, it was the temperate zone equivalent of bamboo and you could weave these things, you could weave it into homesteads, fencing and so it goes, it was a useful way of behaving.

So every stump produced between 3 and maybe 8 new trees. But it had this virtue, that if you plant a seed you get a tree in about ten years, it takes that sort of time because the initial growth, the first, second, and third year, is very tenuous- from that tiny energy store you've got to develop a large tree. Cut the tree down and you've got an enormous underground store, and it goes forth and it grows straight away, and your first and second year's growth are enormous. If you can protect your first year growth from deer, or horses, or pigs, the second year is hardy enough to resist alot of animals browsing it.



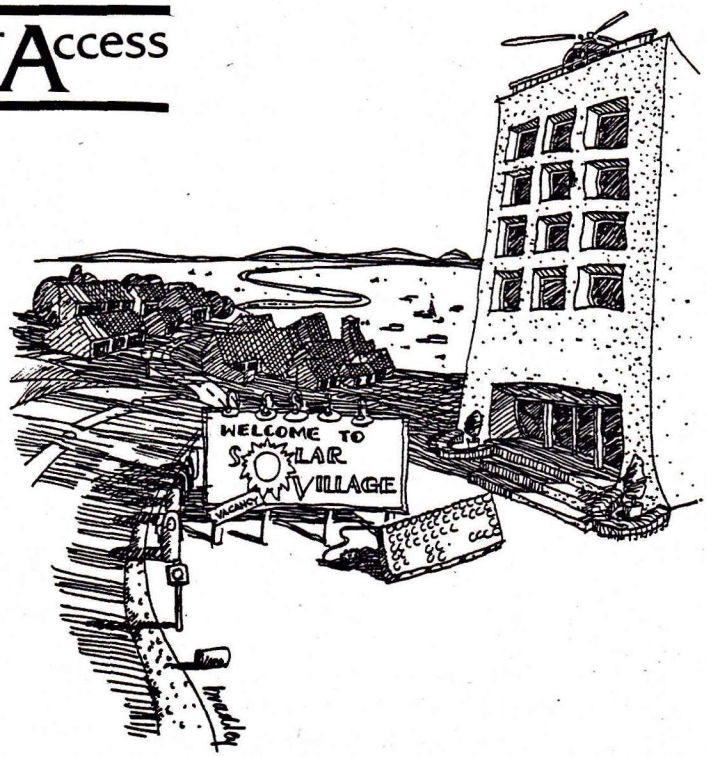
But you see the pressures on your forests in those days were much less than today. And it's very, very hard for us to understand that in those days, in the summertime, the people lived mainly in the fields and in the wintertime they lived mainly in the forests. All the industry went into the forest and they spent the winter making wooden things, making charcoal and tending their animals. The pigs were in there, eating the acorns that were left; the whole of industrial life in villages moved into the forest- they cut the timber to see where they were. They prepared it. Then they did things with it throughout the fall and summer. When the early pilgrims came here they had no need to cut timber on a 25 or 50 year cycle, they just moved on and on and on. And the deforestation here was enormous. And the records are quite mind boggling, much like what we are doing today in Indonesia, went on then in Michigan.

Judy McGimsey, Greenhills A.T. Coord., gave us a tour of this stand of ten year old persimmon trees.

It was so thick with forest you couldn't travel it, now its just a sandy waste. Well, at the time, when historically you would have expected they would have started cutting the second growth (coppicing growth) coal was in use, so they didn't need it. The only thing they wanted coppice wood or timber for was charcoal for making steel. Then Bessomer invented the coking process from coal and so the pressure to regrow the trees and to look after them to husband them on a coppicing rotation program, collapsed. Today, we are still felling "second growth" forests, yet are not coppicing. You see today all our timber is second growth, mainly seedling. But it's allowed to grown to a large size and then sawn. We are looking for board timber, we're not looking for wands growth. Now when we found a need for second grade wood for paper making, the paper industry became voracious. They looked at the possibility of cutting every year on an annual cycle, or a 3 year cycle. But they are really looking hard at one year cycling. They call this short rotation forestry, and I came over here already interested in coppicing because I had seen it going on in Britain and I had watched people making furniture in the woods all winter long for their livelihoods And when I discoverd there was no coppicing going on here at all, I began to ask why and I cast around and I found this short rotation forestry being practiced in two or three centers for the paper industry. I knew that this is a "no go" road, the demands that short rotation forestry makes on the soil is such that it can't be a sustained yield. Then interest in short rotation forestry begain to wane because they discovered -surprise, suprise- that it didn't yield on a sustained basis. So it's only a viable road on very rough terrain thay you can't use for anything else. If you are going to use it on screed, and scrub, and bluff and rocky ground which can't be plowed, how are we going to plant the little things? It becomes very expensive so that there is this intense compulsion to borrow money from the banks and pay 15% interest every year. You can't do that on a 75 year coppice program which gets energy out of the soil for your children.

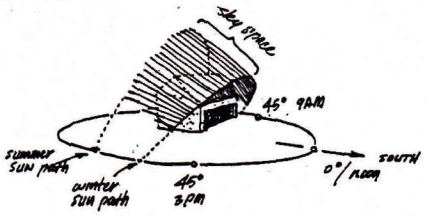
So, the whole of our ethos today, to get it in the bank each year, frustrates any sane behavior such as the Europeans have practiced for thousands of years. So, we are looking at alternative types of growth which will give use the same results as they desire in an ecologically or agriculturally sane way. **Continued on p. 10**

Solar Access

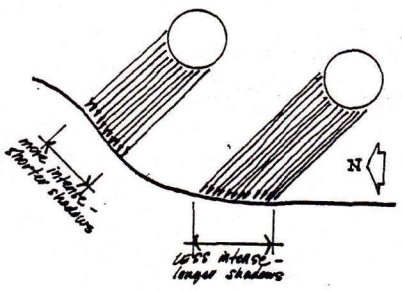


As competition for energy sources on the planet stiffens more and more folks are getting interested in solar access (SA). What this amounts to is keeping the shadows cast by neighboring buildings and vegetation off your solar collection areas (existing &/ or potential). Protecting access to air, light and views offers similar historical cases.

Let's have a look at some of the key aspects to good SA. First off, we need to establish the intended uses (solar space heating &/or cooling, hot water, food growing, suntanning, food or clothes drying, etc.) Heating and cooling are the two major requirements in Texas (go to the beach for a tan). The next step is to establish a "sky space"/an unobstructed view of the sun for the collector. The sky space can be defined by the lowest and highest path of the sun in the sky (winter & summer respectively). Diagram I. illustrates this seasonal change. Note also, that the usable portion of the space is between 8 or 9 in the morning and 3 or 4 in the afternoon. Before or after this period the sun is at too oblique an angle and there is too much atmospheric filtering to be of much use. (This applies to common flat plate collectors; tracking sorts may profit slightly from earlier sightings). While interpreting the diagram, keep in mind that the sun's location can be described by two measurements: 1) the Altititude - the height above the horizon 2) the Azimuth - the position of the sun east or west of the True South line. These solar angles of altitude and azimuth are directly effected by the latitude of the site. Usable sky space for space and water heating in most of the Northern Hemisphere is between azimuths of 45° plus and minus. Solar altitudes below 12° are practically useless for solar energy collection purposes. The farther north one goes the longer the shadows cast by trees and buildings. Similar phenomenon may be seen on sloping sites where the energy received per square foot is greater than on a level site. Shadows cast by identical objects are shorter on sloped terrain than on flat. Diagram II. features this "perpendicular effect."



DIA. I SKY SPACE



DIA. II SLOPES

In much of Texas where cooling is a major concern, SA takes on a different twist. Interestingly enough, cooling regions require larger sky spaces. This is due to the higher temperature requirements for today's absorption cooling equipment and the fact that there is more usable sun in the summer season. While a neighbor's shade tree or two story house can cut your cooling bill at present, new innovations in solar cooling equipment may substantially change that picture. Where the benefits of shade trees outweigh the drawbacks, remote (centrally-located) banks of collectors may offer an alternative. Passive solar solutions are particularly sensitive to shading on the south-facing wall surfaces. Improper pruning of deciduous trees can increase wintertime, bare twig density; shading collector arrays and decreasing deliveries. The list of considerations is sizeable, however with thorough planning quite predictable.

Some of the common strategies for SA are: street widths and orientation, siting and setbacks, building and vegetation height restrictions, etc. Probably one of the most crucial of these practices is proper street orientation. Running streets on an east-west axis is very effective in conventional developments. Another technique involves setbacks which allow for buildings sited close to the north or south property lines.

Implementation of these regulations is taking the common form of covenants (deed restrictions), easements, and zoning. A covenant is a private agreement to protect solar access after construction is completed. An easement is actually an interest in real property which transfers a benefit and/or burden. This would take the form of an individual negotiation. Zoning would effect such things as setbacks and height limitations.

Ultimately the question of solar access will, and should; effect the real value of existing houses and lots, as well as potential land for developments. Considering this, the wise home buyer would do well to examine the property's solar potential. Typically, in any natural system the inter-acting parts must harmonize in order to preform. I see the issue of solar access as a healthy sign of our attempts to harmonize our man-made environs with itself, and with the tenants of natural phenomenon.

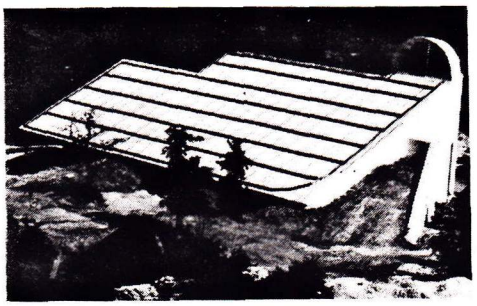
- Bob Bradley

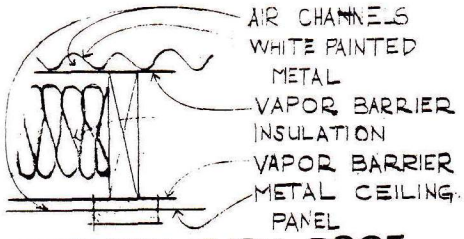
NOTE: More specific data may be had from the Government Printing Office, Washington, D.C. 20402

1) Protecting Solar Access for Residential Development: A Guidebook for Planning Officals GPO stock no. 023-000-00523-9 $4.75

2) Site Planning for Solar Access: A Guidebook for Residential Developers and Site Planners. GPO stock no. 023-000-00545-0 $4.75

Radiant Cooling





SECTION THRU ROOF

An interview with Jon Hand by Steve Anderson and Steve Wilson.

W/A - How did you first approach the cooling system design in the Wise County residence?

JH - I tied radiational cooling in with the whole building structure using building climatology as much as possible. I analysed where heat sources could come from, the kind of environment which could maintain a desired level of comfort for the people inside. I looked at the climate, the site, and tooks it's pluses and minuses point by point. I studied the efforts of other people in other areas of the world and what they had done to minimize cooling loads.

W/A - What were your primary strategies?

JH - Because I had been dealing with earth sheltered housing and knew that that in itself would reduce cooling loads quite a bit, I tried to utilize that somewhat - we did not have the budget in this particular project to go with a full earth cover and a really heavy structural system so I settled for berming - actually cutting the house into a hills into a hillside with the earth mass mostly on the west and the north sides which are the harshest environments. The mass of the house and the earth its in contact with would be a stabilizing influence which would minimize the peak heating gains that would come in the afternoons. It also proveded some reduction of heating load in the wintertime that would be needed to offset the cold wind that would blow out of the north. The house is sited such that it is open to direct solar gain at all times of the year with a shading system to shield them from the sun at those parts of the year when that was necessary.

W?A - In the hottest part of the summer what is the temperature in the house at six o'clock?

JH - The temperature in the house is fairly constant throughout the day. I would say the temperature would peak in the mid eighties with a 10°F wing throughout the day. The house is really two houses, there is a central core which is very massive and very stable and there is a south porch area and an eastern buffer which are light-weight construction with large areas for ventilation - so those areas will cool off fast in the evening and that's where they would live in the summertime.

W/A - How is the radiational cooling system set up?

JH - The radiational cooling system is a roof surface connected by a series of ducts and fans to a number of spaces - either into thermal storage or a root cellar or to the habitated space or to the plenum which includes the total ceiling of the room so that the mean radiant temperature of the space is lowered. The system is flexible enough that the occupants of the home can select whichever mode is appropriate for the environmental conditions and their needs at the moment. The roof itself operates in a cooling mode throughout the year. It can produce 27°F (15°C) dealta T below the ambient air temperature outside if the windspeeds are minimal and the humidity is low outside and there are few clouds in the sky. A change in those factors would alter the performance of the roof. Worst case situation would be a humid overcast day in which the roof system would remain essentially neutral. It would not add any heat load to the building itself. But it would not actively cool the building. The system works more than just at night, it also becomes active in the late afternoon and is active into the morning hours until the sun has risen.

W/A - What kind of white surface are you using?

JH - Its an exceptionally esoteric material called Sears "Weatherbeater" white paint - this was sprayed onto corrugated galvanized steel. The people I contacted told me I could expect probably between a five and ten year lifetime on the surface before it would probably need touching up. I tested the Weatherbeater against Nextel Black and White, an aluminum surface, carbon black and a selective surface that is under investigation in Italy using tedlar and the Weatherbeater performed - it's emissivity appeared to be equivalent - or very close to that of the Nextel White and Black.

W/A - Did you do anything to the galvanize first?

JH - We cleaned the galvanized with an acetic acid solution. We were advised that the weatherbeater would not require a primer to bond to metal. So far it has stood up well to foot traffic. The roof itself never has gotten more than one or two degrees above ambient air temperature so we are not requiring the coating to withstand 140°F temperatures. If the system for some reason doesn't function, the worst thing that can happen is you've got a neutral roof surface. Anybody could paint a metal roof with a good white paint and get real benefits. That's an item of the science of building climatology which is something all people ought to be doing.

W/A - What are your favorite books of building climatology?

JH - Man Climate & Architecture by Givoni. There was some really neat research done back in the 50's by some people out in California, they were doing it for experiments with agricultural shading to make a better environment for cows. They were doing better research for that than corresponding research for humans. I took alot of their information.

W/A - What do you know about current research in selective surfaces for cooling?

JH - Current research that's being done is into specialty paints and windscreens or combining a windscreen and a selective surface all in one.

W/A - You rejected polyethylene?

JH - Yes, its a high maintenance factor. It's very susceptible to hailstorms, high winds, uv degradation, and requires frequent replacement. You do get some extra performance with it and I think on a very small scale system like providing refrigeration wehre you are dealing with 100 sq.ft. that it would be appropriate.

W/A - What about the windscreens?

JH - I chose to use a different kind of windscreen, to use the siting of the building, the angle of the roof, the shape of the building itself to deflect wind, choosing to let the building performance degrade at other times when the wind was out of the north. So I utilized a system of wooden tiedowns which would not require maintenance and which would also perform other functions so there was a cost benefit to it.

W/A - What about the radiational "hole" in the sky?

JH - It's between 8 microns and 13 microns - this is a region where radiation goes from a terrestrial body to the absolute zero of outer space with maybe 10% degradation. The studies that are being done are trying to make best use of that "window". There is research that is being done where they have gotten fantastic delta T's by being radiative only in that window and no other wave length region such that they have got 25C delta T's before they get down to

MARGINAL NOTES

It's been almost a month since my copy of "The Next WHOLE EARTH CATALOGUE" arrived. Stewart Brand's 608 page compilation of "access to tools" has strengthened my biceps and blurred my vision from several excessive midnight readings.

Besides serving as an enormous quality sifter, their philosophy points the way to a co-ordinated use of our existing resource base.

I feel the same sort of thing is needed on a regional basis for Texas. Not having quite the means of the WEC bunch, we're looking at a more modest proposal. Each issue will set aside a section for "Sources & Resources" gleaned from items you send and we collect. The nature of these items is limited only by your imaginations and finding a 15¢ stamp before the postman appears.

Here are some areas to start with:

* Food/solar food drying, greenhouse produce
* Shelter/owner-built structures, tools, materials
* Financing/solar sources, coops, barter groups
* Education/workshops, community courses
* References/books, local publications, libraries
* Transportation/personal and group modes
* Waste disposal/sewerage systems, recycling
* Health care/individuals and centers
* Communities/existing or proposed
* Computers/applications &/or access
* Events/past and future happenings

These are the kind of things we'd like. "Mother Earth News" does a great job covering the national scene, but we could sure use more stuff concerning the Texas area.

For the next newsletter we would like to have any and all info you may have on:

* Solar food drying projects and techniques
* Owner built structures (construction, financing, real estate, etc.)

But we'll take anything - 10's, jacks, aces, whatever... fish.

Please send all information to:

TX-SES NEWS
1007 South Congress
Suite 359
Austin, TX 78704
Attn: ACT bunch

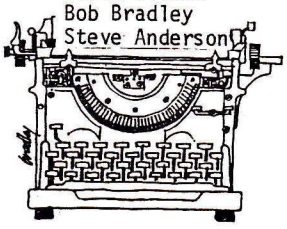
- Bob Bradley

Well one of the things you can do is to grow leguminous trees. There are not many leguminous trees indigenous to Europe, but there are many over here - mesquite, loquinnias, redbud. Mesquite coppices exasperatingly well is what the ranchers say. If you are going to coppice on a sustained yeild basis it should be on the order of (for most hardwoods) probably 12 to 15 years is the shortest you can rotate. You see what people haven't realized is that the whole of a tree is dead - effectively- I mean for all practical purposes its making no metabolic demands and making no metabolic contributions to the life of a tree. The wood inside has functions but they are very low grade, they're doing very little work. The active parts of the tree is a constantly expanding circle, the cambial layer beneath the bark, that's where all the minerals, the micronutrients, all the activity, all the valuable things of a tree are. Now if you have a tree this big across and you want to estimate how much timber there is in there, and for the sake of the record, I'm saying the size of a round table top, its cambial layer right through the tippy-- most top is quite small relative to the total volume of the wood on the way. But if you are engaged in single year rotation, with these wands all squiggly and only about the height of this room, the total cambial layer on that thin stuff is enormous compared to the wood inside. So when you take that away and burn it or pulp it inot paper you've taken away an enormous amount of micro nutrient yield from the soil, just as much as is need for that whole big tree. So that short rotation forestry can only work if you return to the soil in the ash from the furnace or in the paper or whatever, what you took from it. Otherwise, you've got to fertilize it.

What I'm doing is a literature search now of everything I can find in European literature which is very little, and putting together what I can find in American literature, which is mostly disappointed with itself, but there are some people here working exceedingly well, and they are putting that together too - then we shall have a state of the art review which is up to date for now for a lesser developed country to understand and to go with it.

The average production of a forest left alone is of the order of a ton per acre, with coppicing you can get 10 or 12 now easily, 18 is recorded and 20 to 25 is in sight with some of the modern new trees.

STAFF
Steve Wilson
Bob Bradley
Steve Anderson



Continued from p. 7

equilibrium temperature. However, the colder temperature you get, the lower efficiency you will be operating at. You can output great amounts of radiant heat when you are equal to air temperature. If you are wanting a great deal of bulk release of energy, with not very great delta T, radiant cooling is a good way of getting that.

W/A - What are the prospects for radiational cooling around Texas?

JH - I would write Houston off and the gulf coast pretty much. There are people down at Trinity University and the illustrious Mr. Hay that think they can get useable amounts of cooling in Miami Beach and Brownsville Texas and yes there is cooling occuring there but I rather doubt that it is cost effective. I would not make an overall statement saying that the system is going to do people alot of good in a humid area especially near sea-level. You do get greater delta T's and more cooling the higher elevation you get to.

W/A - Can you give us a feel for the actual performance of your system?

JH - Good conditions will produce at least a 18°F (10°C) difference between the radiant surface and the ambient temperature. Using a 1/10th hp fan across a 30' manifold and under a 2cm., 24ft. run, we experienced a reduction in the transfer media temperature on the order of 60% of the ambient/surface delta T, or in this case 10.8F.

SLOWLY THEY TURN, INCH BY INCH

Heroic efforts by the Institute for the Design of Environmental Alternatives (IDEA) of San Antonio resulted in the December 11 Forum on Appropriate Technology. The forum, co-sponsored by the World Futurist Society, attracted 80 San Antonians who listened to presentations on Solar greenhouses from Ed Perry and organic horticulture from Herb Uecker. Mr. Alton Newell of Newell Recycling Industries, one of the most progressive industrial recyclers in the country,received applause for his admission, "I'm a junkman." Controversy was sparked when Bob Russell, Susan Derks and Rick Manning presented the Austin Renewable Energy Resources Commission development plan for Austin.

Amazingly, through the two hours of speakers, nary a person left and the audience was downright curious and eager to hear about the facets of appropriate technology. A lively question and answer period followed each speaker and after the forum many stayed to exchange their opinions and experiences.

-- David Mumm

CATCHING THE WIND

BASIC CONCEPTS, POWER AND ENERGY

Introduction

The consumer is interested in the annual energy output and the cost of that energy produced by the wind energy conversion system (WECS). Windspeed is the most important factor in determining energy and power in wind and the amount of wind energy captured by the WECS depends primarily on the size of the rotor (area).

Energy and Power

Energy and power are closely related as power is the amount of energy over a period of time.

Power = Energy/Time
Energy = Power X Time

For a given time period, if either energy or power is known then the other quantity can be calculated. For example, an electric motor with a power rating of 10 kilowatts, which is run for two hours, will consume w0 kilowatt-hours of energy. A kilowatt (kw) is a measure of power and a kilowatt-hour (Kwh) is a measure of energy. Ten, 100-watt lightbulbs would have a power rating of 1000 watts, which is equal to 1kw. If electricity costs 5¢/kwh, then leaving those 10 lightbulbs on all the time would cost $1.20 per day since the energy consumed is:

1 kw x 24 hr = 24 kwh

Objects in motion have energy, kinetic energy; therefore moving air has energy, referred to as wind energy. The power per area in the wind is proportional to the cube of the windspeed.

Power/area = ½ x density of air x windspeed cubed = $dv^3/2$

at high windspeeds there is a lot of power as demonstrated by wind damage during a severe storm. If the windspeed increases from 10 to 20 miles per hour (mph) the power increases 8 times, and at 50 mph there is 125 times as much power as at 10mph. This is the reason wind turbines have some form of control to limit power captured at high windspeeds, or they would be damaged or destroyed.

If an average density is assumed and the windspeed is in miles per hour, then the power/area is given by:

$P = 0.0051\ V^3$, watts/ft.^{2}

If a density of 1 kilogram/(meter)^3 is used and the windspeed is in meters/second (1m/s = 2.2 mph), then the power/area is given by

$P = 0.5\ V^3$, watts/m^2

Estimation of Wind Energy and Power

Because of the cubic relationship, using a yearly average windspeed underestimates mean power and annual energy in the wind. More accurate estimates can be made from data (windspeed, pressure, and temperature) taken at National Weather Service Stations. This was done for 10 to 15 years of data from NWS stations in Texas and surrounding states (Table 1) by the Alternative Energy Institute. Computer programs tabulated windspeed histograms, calculated power and energy in the wind for each 3 hour period, and summed these values to obtain annual energy in the wind. Average annual energy for the NWS stations in each region were combined to obtain a regional average (Table 2). In general, those regions with an annual wind energy above 80 kwh/ft^2 (Fig. 2) are suitable for installation of wind turbines.

Figure 1. Low Cost 17-meter VAWT at USDA, Bushland, TX. Rotor is 25m (83ft.) high by 17m (55ft.) diameter, chord length is 61cm (24im.), and tower is 2.4m (8ft.)

Estimation of Energy Output of WECS

The most accurate method is to calculate the energy from the performance of the WECS (power output versus windspeed, called a power curve provided by manufacturer) and the windspeed distribution (number of hours the wind blows at each windspeed, a histogram). This method will be discussed in a future column. Other estimations use (1) average windspeed (2) rotor area, and (3) average power.

(1) Some manufacturers included graphs of annual energy output versus average windspeed (Fig. 3). The manufacturer does not know the windspeed for your area, therefore they assumed a windspeed distribution and used their experimental (sometimes a theoretical) power curve to calculate energy output. From Table 1, a rough estimate of your average windspeed at your location will allow you to estimate energy output for that WECS. From Fig. 3, the Windworks unit should produce around 22,000 kwh/yr near Waco (average windspeed = 10.4mph).

(2) The amount of wind energy available increases with the area of the rotor, but only around 30% to 35% of that energy (theoretical efficiency= 59%) will be converted to other forms of energy for end use (electrical, mechanical, thermal).
Areas for different types of rotors (Fig.4) are:

Horizontal Axis:

Area = π X radius spare = πR^2

Vertical Axis: (Giromill, Savonius, Darrieus)

Area = height X diameter = H X D
Area = 0.65 X D

Example: A 32ft. diameter rotor has an area of 804 ft.^{2} Amount of energy passing through that area (from Table 2) in Region 3 is 95 kwh/ft^2 x 804ft^2 = 76,380 kwh/yr. Since only 30% will be converted, the annual output is estimated at 23,000 kwh/yr.
(3) The average power can be estimated at 20 to 25% of the rated power (the size of the generator). The Windworks unit is rated at 10 kw at 20 mph. Of course a larger generator could be used with the same diameter rotor, 20kw at 25mph, so area of the rotor is the most important factor.

Average power = .25 X 10 = 2.5 kw

Estimated Annual Energy = 2.5kw X 8760hr = 21,900 kwh

Economics

Once the energy output is determined the value of the electricity produced by the WECS over the lifetime of the system (assumed to be 25 years) can be estimated from

$$COE = \frac{IC \times FCR + AOM}{AKWH}$$

COE = Cost of electricity (value)

IC = Total initial installed costs

FCR = Fixed charge rate; includes interest, but should be reduced to cover fuel inflation

AOM = Annual operation and maintenance costs

AKWH= Annual energy production

Example: Installed costs for Windworks unit, $30,000 which is reduced to $22,500 after investment tax credit. FCR = 15%, AOM = 1% of $22,500 = $225, AKWH = 22,000

$$COE = \frac{22{,}500 \times .15 + 225}{22{,}000} = \$0.16/kwh$$

A present value analysis would give a more optimistic estimation of the value of a WECS. Pay back times would range from 10 to 20 years depending on present cost of electricity from the utility company, fuel inflation rates, and interest rates. However, there is a meager amount of experimental data on actual energy production and no good data on reliability (lifetime) and maintenance and operation costs for WECS.

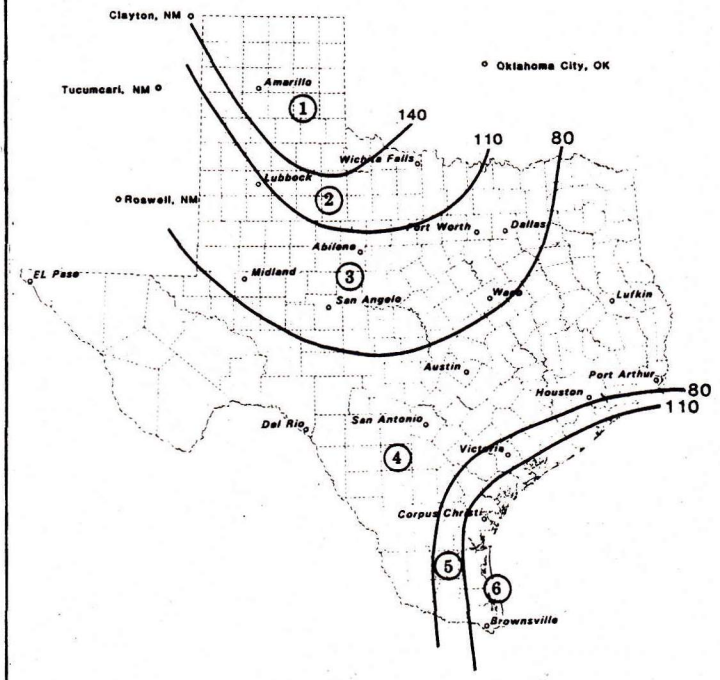


Figure 2. Wind map of Texas. Numbers on contour lines are annual energy, kwh/ft^2.

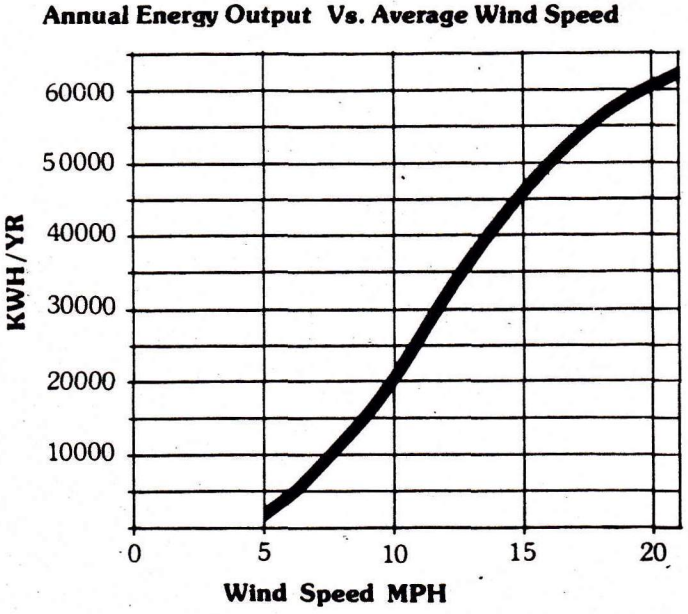


Figure 3. Annual energy output taken from brochure of Windworks 10kw.

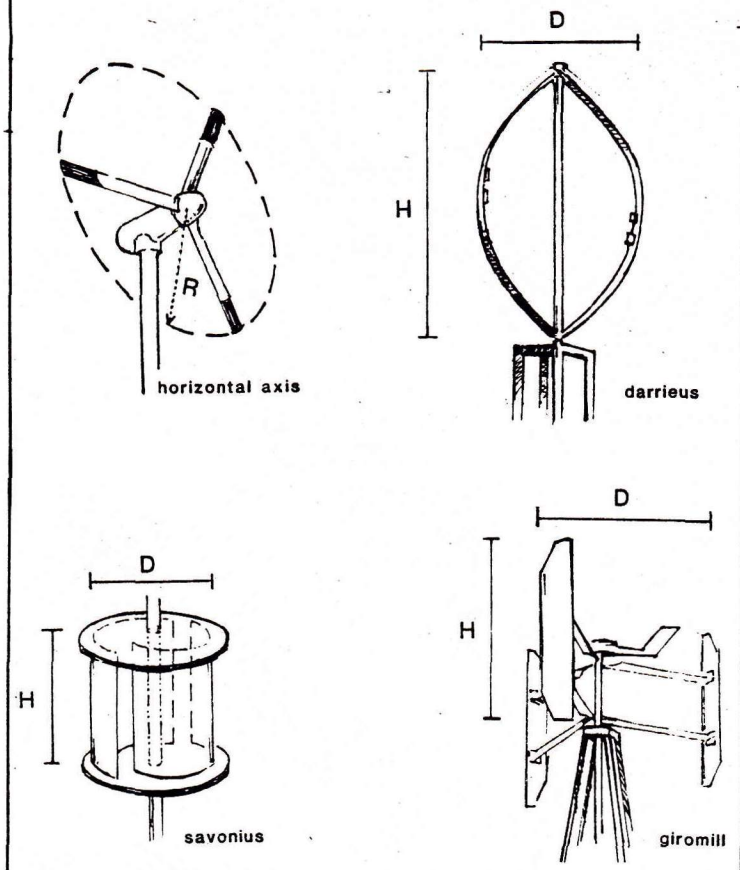


Figure 4. Illustration of dimensions of different types of WECS.

Table 1.

Power and average windspeed for NWS stations. Power is obtained by dividing the energy by the number of hours in a year.

	Energy kwh/ft^2	Power w/ft^2	Average Windspeed mph
Amarillo	178	20.0	13.7
Corpus Christi	136	15.5	11.7
Wichita Falls	129	14.2	11.8
Brownsville	127	14.5	11.3
Lubbock	110	12.6	11.0
Abilene	109	12.4	11.6
Midland	104	11.9	11.8
Dallas (Love)	101	11.5	10.9
DFW International	81	9.3	10.4
Waco	100	11.4	10.4
Houston Hobby	83	9.5	10.2
Victoria	80	9.1	10.0
San Angelo	79	9.0	10.2
Port Arthur	75	8.6	9.7
Del Rio	69	7.9	9.7
Austin	66	7.5	9.3
San Antonio	64	7.3	9.1
El Paso	56	6.4	8.2
Houston International	41	4.7	7.6
Lufkin	31	3.5	7.0
Dodge City, KS	150	17.1	13.1
Clayton, NM	149	17.0	13.0
Tucumcari, NM	82	9.4	10.3
Roswell, NM	67	7.6	8.8
Oklahoma City, OK	116	13.2	11.6

Table 2.

Annual energy and power by region. Average density is given to show the variation; a 20% difference between Region I and Regions 5 and 6.

Region	Average Energy kwh/ft^2	Average Power W/ft^2	Average Density kg/m^3
1	150	17	1.00
2	125	14	1.10
3	95	11	1.13
4	less than 65	less than 7	1.16
5	95	11	1.20
6	125	14	1.20

MAKING THE NEWS

Hot Water Hands-On

SUNCOR;Inc. of Tempe, Arizona has announced its "Build It Yourself" solar water heater workshops will be offered in Texas this year. The program originated at Arizona State Univ. and has been introduced successfully into several surrounding states. Mr. A.L. Pittinger, with SUNCOR, says that workshops are being scheduled in conjunction with the Adult Education Program of the Spring Branch ISD, and at San Jacinto Jr. College in Houston, with other institutions around the state likely to begin soon. The program has been offered successfully in El Paso. For a complete listing of sponsoring institutions, contact Mr. Pittinger at 1270 E. Broadway, Tempe, Arizona, 85282.

Texas Publisher Purchases "Solar Living"

Solar Engineering Publishers, Inc., publishers of Solar Engineering Magazine in Dallas, have announced the purchase of Solar Living and Solar Greenhouse Digest, formerly headquartered in Flagstaff, AZ. Founding Editor of Solar Living, Twila de Vries, will remain on board during the transition, but has expressed the intent to move on to other things. The Digest will continue to be developed as a consumer oriented magazine focusing on the practical aspects of living with solar energy.

Texas Company Acquires Exxon Solar Division

In what some energy analysts are calling an "amiable David and Goliath Encounter," a Texas based solar energy company has agreed to purchase the flat plate solar collector manufacturing division of Exxon, a diversified multinational corporation. Brian Pardo, President and Chairman of American Solar King Corporation in Waco has confirmed the agreement to purchase Daystar Corporation and related assets of Solar Thermal Systems, a unit of Exxon Enterprises. Daystar is a manufacturer of thermal solar systems and has a dominant market position in the northeastern United States. The acquisition of Daystar establishes American Solar King as the largest solar energy manufacturer in the medium temperature solar collector field. The negotiated purchase price was $2.2 million.

"Solar Rising:" Conference and Exposition

Solar Rising is a special annual confence of the American Section of the International Solar Energy Society which will include a major trade exposition on conservation and solar energy. It will take place at the Philadelphia Civic Center on May 26-30, 191.

Solar Rising will be a forum where many of the diverse sectors of our Society can share their experiences and gain the information they need for the application of conservation and solar technology. Plenary sessions are planned to give rewarding educational experiences. Workshops, exhibits, seminars, films, tours and other special programs will provide professionals and lay people with insights and practical experiences on topics ranging from sunspaces, wood stoves and wind systems to solar thermal electric power stations.

Solar Rising will include both scholarly and non-technical presentations given by leading figures in the solar energy field. There will be special programs for professionals in design, engineering, government, and industry.

Solar Rising will also incorporate two special programs within the major AS of ISES Conference "On the Rise: Solar in Large Cities" will present the results of a major pilot study, the Philadelphia Solar Planning Project, as well as projects in other large cities. "Solar Commercialization" will focus on the theme of the conference as it relates to market development and business concerns.

Solar Rising will include a major solar trade show with 300-400 exhibits anticipated. Not only solar builders and manufacturers, but designers, distributors, installers, users, financers, and maintenance people of all forms of conservation and solar technology will be represented.

Solar Rising will reach well beyond the conference hall. Major cultural institutions, neighborhood organizations, and government programs from the Philadelphia area plan to conduct exhibits adn seminars exploring the social, economic and artistic implications of the sun in modern society.

Contact: Linda Knapp
Mid-Atlantic Solar Energy Assoc.
2233 Grays Ferry Avenue
Philadelphia, PA 19146





WIND NEWS

Southern Solar Energy Center in Atlanta is planning a commercialization workshop for manufacturers, dealers and distributors in Amarillo the last of February or the first part of March. This workshop will be used by the SSEC to obtain information from the participants as to how to promote commercialization. Persons interested should contact David Ball, SSEC, 61 Perimeter Park, Atlanta, GA 30341.

Dr. Nolan Clark, Program Director for Agricultural Wind Energy Research, USDA, received 1.13 million dollars (FY 81) from the Department of Energy for eleven projects; four in research and analysis, two in farmstead power applications, three in irrigation, and two in building heating.

For one of the irrigation projects, a 17-meter Darrieus unit was installed at USDA, Southwestern Great Plains Research Center, Bushland, TX. (Fig.1) Sandia Laboratories, Albuquerque, NM, is in charge of the Vertical Axis Wind Turbine Program for DOE. Four 17-meter units were constructed by Alcoa, with the first one installed at the Small Wind Systems Test Center, Rocky Flats, CO in August, 1980, and the second unit was installed at Bushland in December. Sandia will conduct certification tests and later USDA will begin application tests. The unit is located next to a deep-well irrigation pump powered by a 50 kw electric moter. Electricity produced by the wind turbine will be used by the motor and excess power will be fed into the utility grid.

A prime concern to anyone considering buying a wind machine is the amount of power that will be produced and what wind energy costs as opposed to conventional sources. Future articles will be on the performance and operation of wind turbines, sitting, and manufacturers in Texas. Comments and suggestions will be appreciated.

We are collecting information on the reliability and maintenance of wind turbines. If you have a wind turbine, please write to us, indicating manufacturer, rating or size, how long it has been operating, cumulative energy output, and problems. Write to Alternative Energy Institute West Texas State University, Canyon, TX 79016.

RAYS OF HOPE

Bastrop Prison Wins Solar Design Award

Caudill-Rowlett-Scott, Architects, Engineers and Energy Planners, Houston, has been named the winner in the Governmental-Built category of Owens-Corning Fiberglas Corporation's 1980 Energy Conservation Awards Program for its energy efficient design of the Federal Correctional Facility for Youth Offenders at Bastrop. "This correctional facility provides a very fine example of the need to integrate energy conserving elements with the initial design of the building," says Ezra Ehrenkrantz, a member of the awards jury from New York.

"Our economic design goal was to build a facility to obtain data on active solar energy systems," explains Paul Dennon, president of Caudill-Rowlett-Scott. "The facility was designed to shave peak electric power load and to save gas and oil, both non-replenishable energy resources. Early reports, in fact, indicate the system is performing as well or better than we anticipated."

Through load matching, solar energy is used efficiently without the expense of oversized thermal storage systems. The system is designed to provide 96.6% of the domestic hot water, 45.5% of the heating and 8.6% of the cooling through an absorption chiller.

Texarkana Army Facility Solar Heated

A solar hot water generating system, expected to save as much as $10,000 a year in heating costs, was formally accepted in a ceremony at Lone Star Army Ammunition Plant.

Lt. Col. Carl V. Glover, commanding officer at the plant, said the three-and-a-half year project was designed primarily to demonstrate the practical application of existing solar technology in an industrial plant.

"We purchased the equipment necessary to build the solar system from 'off - the-shelf" items readily available on the commercial market," Glover told an audience of about 20 people outside one of the five boiler houses at LSAAP.

According to Andrew Rose Jr., senior engineer at the plant, the 21-panel solar system was installed for $160,000 and will pay for itself in 10 to 12 years.

Rose said the project has worked so well, two other systems are being contemplated for other boilers at LSAAP.

"Basically, what we are seeing is the practical application of solar energy coming of age. Ten years ago, or even less, I would have been tossed in the looney-bin for even suggesting such an idea as solar energy for an energy alternative.

- Gazette-News
Texarkana, TX

Solar Orientation: Port Arthur Takes The Lead

Solar Power - Port Arthur emerges as leader in energy field

The municipality that bills itself as Energy City, USA - and whose future is linked to the economic health of the massive Southeast Texas oil and gas industry - was also one of the first communities in the nation to make the bold leap forward in establishing mandatory solar-orientation requirements for new housing subdivisions.

"Port Arthur is way ahead of most other communities," says Marty Jaffe, a senior research associate with the Chicago office of the American Planning Association. "They are one of the leaders in the field of solar orientation and solar regulations."

A recent APA of 1,400 local, regional and state planning agencies disclosed that Port Arthur was the only community to have passed a mandatory solar-orientation ordinance affecting residential development.

The city's program requires that 80 percent of the buildings in new subdivisons must be solar oriented. The city's program provides a model for other cities and has perked the interest of other cities across the nation.

- Port Arthur News

House Panel Wants Energy Development Lobbying

The House Committee on Urban Needs has recommended spending at least $1 million a year on Washington lobbyists to build Texas' energy resources and to make sure the state gets all the federal money it can for the poor, deaf, retarded and disabled.

The committee concentrated on urban economies, energy, human services, transportation, labor and crime prevention in analyzing the cities' needs until the end of the century.

The report described Texas' energy picture as "depressing", with energy consumption and prices going up. Dr. Milton Holloway of the Texas Energy and Natural Resources Council predicted energy costs would rise five times by 2000.

Solar and other alternative energy resource projects, "coupled with a strong lobby effort" for federal funds, "could make the state a proving ground for the development of such energy alternatives" the report said.

AUSTIN (AP)

Windmill to be Built at TSU

A 80-foot windmill that should generate enough electricity to run two all-electric homes will be in place in Dublin, TX by late spring as part of a pragmatic Tarleton State University experiment with wind power.

The $16,000 wind powered generator is to be installed near the Tarleton State dairy and probably will produce about half the electrical needs of the facility, said Dr. Jim McCoy, a physicist.

McCoy plans to install the tower and its 32 foot blade with a grant from the Center for Energy and Mineral Resources at Texas A&M University. Tarleton is part of the Texas A&M University System.

Construction of the unit caps two years of preliminary fact-finding by McCoy.

Supported by smaller CEMR grants, he first audited the electricity used by 10 typical dairies in the area, then mounted wind velocity measuring instruments at varicus heights to determine the feasibility of a wind-driven generator.

McCoy said that although wind speeds apparently vary greatly year-to-year, the power windmill should produce about 35,000 kilowatt hours of electricity per year at a cost of 7 to 8 cents per kw hour.

To improve the public's awareness of wind energy and to draw attention to the project, the tower will be constructed near U.S. Highway 281, main north-south road through this community southwest of Ft. Worth.

- Dublin Progress

Upton County Possible Solar Desalination Site

Upton County residents may get cleaner drinking water - free- if a government project to begin there is approved as a final test site to begin operation in early 1983.

Ernie Crawford, president of the Permian Basin Regional Planning Commission, announced the body had approved an application from Boeing Engineering and Construction Co. to begin work on a solar-powered water desalting plant in Rankin.

Boeing was awarded a contract by the Solar Energy Research Institute to prepare conceptual designs for a desalination system that would transform brackish well water into potable water.

The contract covers phase 1 of a three-phase program sponsored jointly by the governments of Saudi Arabia and the the United States and administered by SERI to advance the development of solar energy technology in the two countries. Phase 2 will involve construction of a pilot plant and phase 3 will cover pilot plant operation and training.

TX-SES MEMBERSHIP APPLICATION

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Member of AS/ISES? ☐ Can you open your solar home, etc. to tours? _____

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Solar Involvement:

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*Note: Only Texas registered architects or engineers should check Engineer or Architect, others check Design.

_____ I wish to become a Full Member (Voting, 1 year subscription to quarterly TX-SES News, special rate for subscription to Solar Age. $15.00 enclosed. $10.00 with proof of membership in Affiliate Chapter. (See list on back of this form.)

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Make all checks payable to TX-SES and send them to: TX-SES, 1007 South Congress, Suite 359, Austin, TX 78704. 512/443-2528.

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All memberships extend for 1 year from month of joining.

TEXAS SOLAR ENERGY SOCIETY: AFFILIATE CHAPTERS

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El Paso Solar Energy Association
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Attn: Gary Ashe, Pres.
915/747-5771

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Houston, TX 77019
Attn: Rick Brand, Pres.
713/622-3133

Coastal Bend Solar Energy Society
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Corpus Christi, TX 78403
Attn: Rick Vrooman, Chrm.
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West Texas Solar Energy Society
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Attn: Glenn Hill, Pres.
806/745-1533

Panhandle Solar Energy Society
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Amarillo, TX 79102
Attn: Rick DeVoe, Pres.
806/355-6528

☐ Please send information on the American Section of the International Solar Energy Society. (TX-SES members may join AS-ISES at a $5/yr. discount.)

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