

Station News

Georgia Tech Engineering Experiment Station

VOLUME 11 NUMBER 1

JULY 1980

Fluidized Beds Could Solve Solar Storage Problem

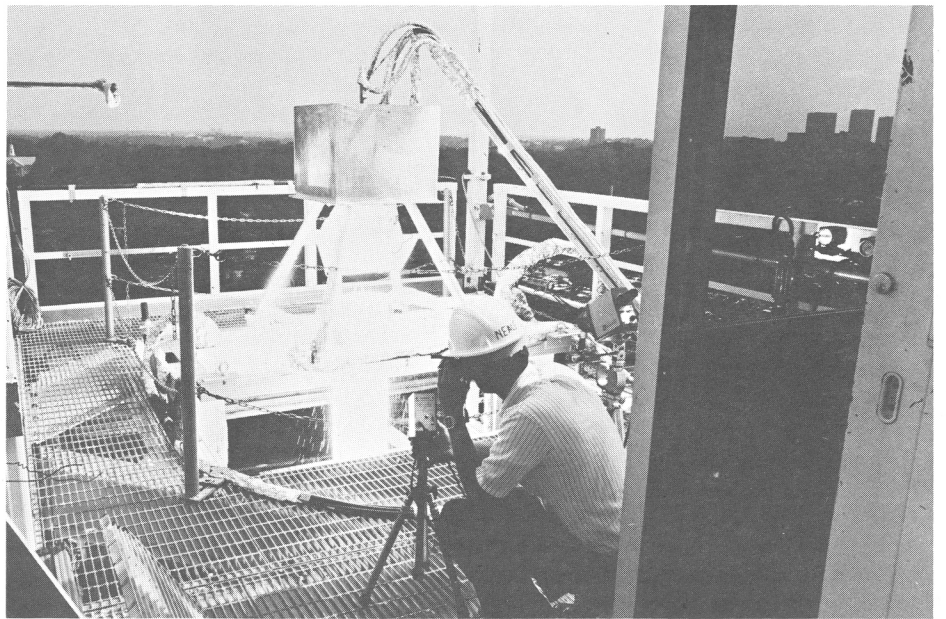
It can't be kept in an oil drum and won't flow out of a pump at the turn of a switch. That, in essence, is the major problem confronting solar researchers: how to store energy from the sun.

Simple chemical compounds can hold tremendous amounts of solar energy for indefinite periods of time. Using this principle, EES researchers hope to build a solar reactor which will use heat from the sun to link carbon and water into combustible compounds. The result of this union will be syngas, a mixture of carbon monoxide and hydrogen which can replace petroleum in a number of industrial and residential applications.

A fluidized bed is the type of reactor envisioned. "Fluidized beds are one of the most promising concepts for using solar energy to produce chemical feedstocks and fuels, including syngas," said Doug Neale, senior research engineer with the Solar Energy Research Branch. "They represent a compact and efficient means of transferring energy from the sun into storable and combustible chemical compounds."

The Solar Energy Research Branch is already working with Westinghouse to determine the feasibility of fluidized bed reactors. In a series of recent experiments at the Advanced Components Test Facility, a Westinghouse-designed fluidized bed receiver system was tested. In particular, the heat absorption and transfer properties of such inert bed materials as sand, silicon carbide and small copper shot were evaluated.

In the experiments, air was blown upward into a cylindrical quartz column to agitate — or fluidize — the enclosed



Doug Neale, senior research engineer, Solar Energy Research Branch, measures the heat produced during a test run of the Westinghouse-owned fluidized bed receiver. Temperatures of 1000 degrees Fahrenheit were achieved when concentrated beams of sunlight were focused on the quartz receiver.

bed materials. After the materials were set in motion, a concentrated solar beam was focused onto the receiver.

"The agitation allows energy from the solar beam to uniformly heat the bed materials. The bed materials in turn heat the air being blown through the receiver column," said Neale.

The temperature of the heated air was then measured to determine the efficiency of transferring the solar energy into the air. Neale says that net temperatures of 1000 degrees Fahrenheit were achieved.

"We are intensely interested in the data from these experiments," said Neale. "These initial tests did not involve chemical reactions, but they did provide information on how a fluidized bed and various materials react under intense exposure to a concentrated solar beam."

"A year from now we hope to build a fluidized bed reactor that will use reactive chemical materials as the fluidizing gas. In such a reactor, new chemical bonds will be formed by the reactive chemicals as they are heated by the bed. Solar energy used to heat the bed materials will be "trapped" in the new chemical bonds. The resulting gases can then be conditioned and stored for later use. When these products are burned, the chemical bonds will break and release the stored solar energy," said Neale.

According to Neale, the Tech/Westinghouse-designed reactor could also be used to produce synfuels through gasification or pyrolysis of biomass materials.

A proposal has been submitted to the Department of Energy for the construction of a fluidized bed reactor.

EES Staff Members Attend Conferences, Publish Articles

CHEMICAL & MATERIAL SCIENCES LAB

Kathryn Logan received an award for outstanding achievement in graduate studies in June from the Society of Women Engineers.

COMPUTER SCIENCE & TECHNOLOGY

John Passafiume and **Fred Cox** taught the Ada Education for Technical Managers Course at the Defense Advanced Research Projects Agency in Washington, D.C., in June.

Billy Wise presented a paper on "Command and Control: What Is It and How to Measure It" at the May 28 MIT/ONR Workshop which was held in Silver Springs, Md.

ECONOMIC DEVELOPMENT LAB

On June 4, **Nick Gibson** presented a paper on "Energy Conservation through Project Planning and Design" at the 1980 Solar Jubilee Conference in Phoenix, Ariz.

Bob Cassell chaired the Literature Awards Program of the American Industrial Development Council Conference held in Atlanta in May.

William Spain presented a paper on "A Free On-Site Occupational Safety and Health Consultation Program" at the American Industrial Hygiene Conference on May 18-23 in Houston, Tx.

ELECTROMAGNETICS LAB

Orman Simpson presented a paper on "Analysis of the Optical Constants of Liquid Water Measured With an Optically Pumped Laser" at the annual meeting of the Georgia Academy of Science in April at Mercer University.

The June issue of "Microwaves" magazine carried an article by **Robert McMillan** and **Julius Rainwater** on "Quasi-Optics: A Hybrid Technology for Near-Millimeter Waves."

Dennis Kozakoff and Lab Director **J.W. Dees** participated in the June International Symposium on Solar Power Satellites in Toulouse, France.

ENGINEERING EXTENSION LAB

George Fletcher and **Ed Jacobson** coauthored a paper presented at the annual Solar Jubilee Conference held in June in Phoenix, Ariz. The paper was entitled "Flat Plate Photovoltaic Balance of System Cost Study."

In Memoriam

EES extends its deepest sympathies to the family and friends of **Jerry Lewis**. Mr. Lewis died on Saturday, June 21, at St. Joseph's Infirmary after a sudden heart attack.

In his 22 years at Georgia Tech, Mr. Lewis held numerous positions of responsibility. At the time of his death, he was a senior research engineer, manager of EES' Editorial Assistance Department and secretary of the Georgia Tech Faculty Status and Grievance Committee.

One of his most notable achievements was a study on the problems of small manufacturing companies in Georgia. The study resulted in the creation of EES' field office program in 1961. Today, the program is acknowledged as a national model among similar engineering extension programs.

Mr. Lewis also served as associate director of Tech's Economic Development Laboratory, associate chief



of the Industrial Development Division and head of the Manpower Resources Branch.

Mr. Lewis made many friends among his coworkers during his distinguished career at EES and we will all miss him. Those who wish to do so may send contributions to the Bible For You, Inc., P.O. Box 15007, Atlanta, Ga. 30333 or to Young Life, P.O. Box 520, Colorado Springs, Col. 80901.

RADAR & INSTRUMENTATION LAB

Gene Greneker and **Jim Metcalf** attended the American Meteorological Society Conference on Radar Meteorology in Miami Beach, Fla., on April 15-18. Metcalf organized a workshop and presented two papers: "Airborne Weather Radar and Severe Weather Penetration" and "Propagation Effects on a Coherent Polarization Diversity Radar."

SYSTEMS ENGINEERING LAB

Robert Wohlers presented a paper on the "Application of Adaptive Polarization ECM (APECM) to Polarimetric Radar" at the U.S. Army Missile Command, June 25-26. **Jerry Heckman** co-authored the paper.

An article written by **Larry Holland**, **Neil Hilsen**, **James Gallagher** and Grady Stevens of the NASA Lewis Research Center was published in the June issue of "Microwave Journal." The article was entitled, "Systems Analysis for Millimeter Wave Communication Satellite." **Jim Wiltse**, EES associate director for electronics laboratories, served as guest editor of the special issue.

"Multifrequency Radar Sea Return"

was the subject of a paper presented by **Fred Dyer** at two meetings in June. Coauthored by **Bob Trebbits** and **Nick Currie**, the paper was delivered at the North American Radio Science Meeting and the IEEE/AP-S International Symposium at the University of Laval in Quebec, Canada.

SYSTEMS AND TECHNIQUES LAB

Both **Dan Bodnar** and **Larry Corey** attended the IEEE Symposium in Quebec, Canada in early June. Bodnar and Corey presented two papers each during the professional program sessions.

TECHNOLOGY APPLICATIONS LAB

Two people in TAL were recently quoted in professional publications. **Carol Aton**, head of the Technology Transfer Group, was interviewed for the May issue of the "National Fireplace and Woodstove Journal." **Craig Wyvill**, Agricultural Technology Group, was quoted in the June issue of "Industrial Hygiene News."

Ken Weider, media specialist for the Energy Conservation Division, conducted a Communications Workshop on June 25 at Georgia Tech.

EES Promotes Clean Water In Third World

EES is involved in a continuing effort to make clean drinking water more accessible to people in Third World nations.

The Engineering Extension Laboratory (EEL) began work in this field in 1976, when the Agency for International Development (AID) contracted with EES to field test an AID/Battelle hand-operated water pump in Costa Rica and Nicaragua.

Engineers from EEL's International Programs Division installed locally-manufactured AID hand pumps in the two countries and set up field laboratories for on-going analysis of water quality. They concluded the project with a recommendation that the pump design was appropriate for Third World nations.

In the past four years, EEL's Water Resources Group has literally traveled the globe teaching Third World nations to use basic technologies for acquiring and purifying water.

Phil Potts, Water Resources Group leader, reports that hand-operated water pump programs have now been



A hand-operated water pump is installed in LaGarita, Nicaragua with the assistance of the Engineering Extension Laboratory's Water Resources Group. The Water Resources Group has helped 11 underdeveloped countries to install and operate similar water pumps.

conducted in 11 countries. A large-scale water and sanitation project, for example, was recently begun in Indonesia where 230 AID hand pumps will be manufactured and installed in remote areas.

Potts has just returned from Sri Lanka where a large contract was signed to initiate a rural water supply program involving hand-operated

water pumps. Potts has also been contacted by AID to open discussions on feasibility studies for the local manufacture of hand-operated water pumps in Tunisia, Haiti, Honduras and Ecuador.

Potts says the programs of the Water Resources Group are sure to escalate during 1980-1990, the period designated by the United Nations as "UN Water and Sanitation Decade."

Labs Secure New Contracts, Research Moves Ahead

CHEMICAL & MATERIAL SCIENCES

J.L. Brown, Analytical Services for 1980 Quality Control, Southwire Company, \$1,000.

D.J. O'Neil, Design, Fabrication & Operation of Biomass Fermentation Facility, Midwest Research Institute, Solar Energy Research Institute Division, \$98,555.

J.L. Brown, Metallurgical Tests and Studies, Tennessee Valley Authority, \$20,000.

COMPUTER SCIENCE & TECHNOLOGY

J.A. Mahaffey, Design Study for a Hardened AOC System, EG&G Idaho, Incorporated, \$49,992.

ELECTROMAGNETICS LAB

J.L. Archer, System Performance Evaluation Environment, U.S. Army Missile Command, \$28,000.

D.E. Schmieder, Target Acquisition Modeling, U.S. Air Force, \$8,995.

ELECTRONICS TECHNOLOGY LAB

B.J. Cown, TSM Multiple Obstacle Model, Atlantic Research Corporation, \$37,979.

B.M. Jenkins, Cardiac Pacemaker EMI Investigation, Cardiac Pacemakers, Inc., \$8,000.

ENGINEERING EXTENSION LAB

N.C. Wall, Assist Government of Panama in Designing and Developing an Industrial Extension Service for Panama, U.S. Aid Mission to Panama, \$7,795.80.

G.H. Lee, A Program of Technical Assistance, Georgia Crate & Basket, \$2,000.

R.L. Tessner, A Program of Technical and Design Assistance to Improve the Functions and Perform-

ance of Cagemaster Poultry House Equipment, B.E.C. Incorporated, \$2,200.

RADAR & INSTRUMENTATION LAB

E.E. Martin, Amphibious Assault Landing Craft (AALC) Radar Cross Section Measurements, Naval Coastal Systems Center, \$100,973.

D.D. Irwin, Anti-Armor Surveillance and Target Acquisition Radar (ASTAR) Prototype, USAERADCOM, \$450,008.

SYSTEMS ENGINEERING LAB

M.A. Lipscomb, Revised EW Software Engineering, Warner Robins ALC, \$12,000.

TECHNOLOGY APPLICATIONS LAB

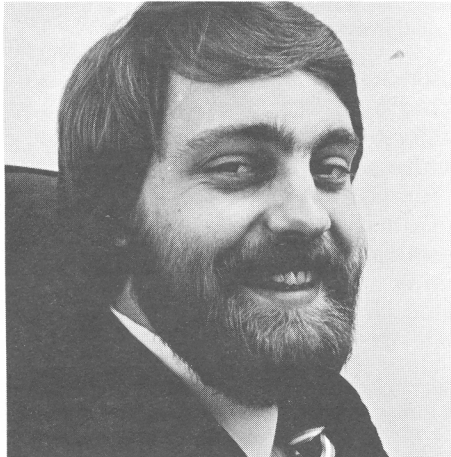
J.L. Clark, Georgia Solar Industrial Process Heat Project, Southern Solar Energy Center, \$49,991.

Robertson To Retire

Doug Robertson, principal research engineer and director of the Electronics Technology Laboratory, has expressed his desire to retire from EES within a year. An exact date for his retirement has not been set because Robertson will remain at EES after a new director has been appointed and a smooth transition has been made.

A search committee has been formed to find a new ETL director and advertisements have been placed in major electronics magazines and periodicals.

Robertson will leave Tech after a distinguished career of 33-years, five of which have been spent as director of ETL. He may also assume a senior staff position before taking full retirement.



Wiggins Wins Scholarship

Roy A. "Chip" Wiggins, an assistant manager in EES' Personnel Office, has been selected as the 1980 recipient of the Georgia International Trade Association Scholarship.

A graduate student at Georgia State University in International Business, Wiggins was chosen for the award based on his excellent academic standing and the professional potential he has shown while pursuing his MBA degree.

The scholarship, to be used in meeting tuition obligations, was presented to Wiggins on May 22 during the World Trade Week Luncheon at the Apparel Mart in downtown Atlanta.



On April 22, RAIL employees helped Lab Director Ed Reedy to remember he had reached his 40th birthday. A large sign proclaiming "Ed Reedy is 40 Today" hung at the entrance to the Cobb County Facility and greeted early arrivers. Reedy managed to get it down, but he could not reach another, similar sign hung between two poles beside the lake. The staff also gave Reedy a surprise birthday party in the afternoon. Part of the surprise was a cake with 40 trick candles.

New Employees Join Lab Staffs

COMPUTER SCIENCE & TECHNOLOGY

CSTL welcomes two new people to its staff. **Ann Evans**, senior secretary, recently transferred from STL to the Software Technology Division. **James Eakes**, a May graduate of Clemson University, has joined the Computer Applications Branch as a research engineer I.

ELECTROMAGNETICS LAB

The Radiation Systems Division welcomes **Mark A. Strickland** to its office in Huntsville, Ala. A research engineer II, Strickland formerly worked for the IBM Corporation.

SYSTEMS ENGINEERING LAB

SEL has created a new library for classified documents and hired **Barbara Sajor** to head the facility. Sajor holds a masters degree in Librarianship from Emory University. She is assisting SEL researchers and serving as a liaison with other libraries and information centers.

Four other employees have joined SEL: **Eric Berkobin**, research engineer I; **Antonia Waugh**, student assistant; **Thomas Murray**, research engineer I and **Kevin Eyl**, programmer III.

SYSTEMS AND TECHNIQUES LAB

Several new people have joined STL's staff in recent months. They are: **Ricky**

Cotton, research engineer I, **Steve Caine**, student assistant, **James M. Moore**, electronics specialist and **Sheila Knotts**, clerk I.

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Vol. 11 No. 1

July 1980

Published monthly for employees of the Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia.

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