

# EES Report

ENGINEERING EXPERIMENT STATION • GEORGIA TECH

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the Nation*



Members of the Joint Senate and House Committee on Energy are briefed on the production of synthetic fuels from wood, grains and grasses at the dedication of Tech's Biomass Research Facility.

## Joint Legislative Committee Attends Biomass Dedication

The Joint Georgia House-Senate Committee on Energy Resources attended the formal opening last month of the Biomass Research Facility on the Georgia Tech campus.

The facility is one of the largest in the country for the study of biomass for energy.

Emphasis at the facility will be placed on the development of wood as an alternate energy source, but will include researching grains and grasses as well. These base products are a prime source of synthetic fuels such as low Btu fuel used for boilers, densified fuel for home or industrial use, methanol for transportation fuel and ethanol for use in gasohol for transportation fuel. Research data to date has shown that these fuels can be effectively obtained from the direct combustion, gasification, fermentation or pyrolysis of biomass.

At the opening of the facility Tech researchers pointed out that the state of Georgia is one of the richest states in woody biomass resources. By combining the wood resources with solar energy,

Georgia might produce somewhere between 10 to 25 percent of the state's total energy needs. Currently, only about three percent of Georgia's energy is produced within its own boundaries, primarily by hydroelectric power.

In addition, the researchers pointed out that wood is currently priced at \$1.30 to \$2.00 per million Btu's compared to petroleum fuels at about \$2 to \$4 per million Btu's. They also said that the price of wood will inevitably be forced higher when demand increases, and the costs of transportation and conversion facilities will be formidable. But projections indicate that wood energy will become more economically feasible more quickly in Georgia than almost any other synthetic fuel source.

Legislators participating in the day's event were Committee Co-Chairmen Rep. Nathan Knight of Newnan and Sen. Parks Brown of Elberton; Sen. Terrell Starr of Forest Park; and Reps. G. D. Adams of Atlanta, Johnny Isakson of Marietta and Gerald Johnson of Carrollton.

## New Radar Technique Improves Weather Analysis

Scientists at Georgia Tech are studying an unusual radar technique for obtaining a variety of detailed information on rain, snow, and hail, as well as non-precipitating ice crystals in clouds.

The technique, known as polarization-diversity, will contribute to improved measurement of rainfall, improved measurement of winds, improved identification of storm hazards such as hail and lightning, and better understanding of atmospheric effects on microwave communications.

The radar technique involves transmitting a circularly polarized radar signal and then separating the returned signal into two components which are right and left circularly polarized. The larger of these components, the primary signal, indicates the rainfall rate, as is done by conventional weather radars. The magnitude of the smaller component, the secondary signal, relative to the primary signal indicates the shape of the raindrops.

For example, a relative magnitude of less than one percent indicates small, nearly spherical raindrops, while a relative magnitude of four or five percent indicates raindrops of five or six millimeter diameter which are more distorted in shape. A relative magnitude of ten percent is associated with irregularly shaped objects such as hailstones.

The use of Doppler radar techniques in conjunction with the polarization techniques described above will provide a measure of the speed of the raindrops or other objects relative to the radar. The current research at Georgia Tech involves the development of analytical techniques for separating the contributions to the relative motion of raindrops due to air velocity and due to their fall speed, thus yielding a more accurate measure of wind speed than is possible with existing Doppler weather radars.

Radar signals passing through the atmosphere are altered if they encounter non-spherical objects such as ice crystals or large raindrops. These alterations are known as signal propagation effects, and under certain conditions the polarization-diversity radar technique permits them to be identified and measured. Such results are of importance to the interpretation of radar echo signals from deep within rainstorms and also in the area of microwave communications.

In thunderstorms, where electric fields repeatedly increase between lightning strokes, small ice crystals, which are repeatedly oriented by the varying electric fields, produce distinctive propagation effects that change in a cyclical manner. Measurement of these propagation effects can yield information on the electrical characteristics of the storm.

Studies underway at Georgia Tech include both the development of the analysis techniques and the design of specialized radars for applying these techniques in experimental programs.

—James Metcalf  
Senior Research Scientist



*Professor Gerard Montel, president of the Institut National Polytechnique de Toulouse, decorates Dr. Ray Young's robes with an epitoge at special ceremonies to present Dr. Young with an honorary doctoral degree in Toulouse, France.*

## French University Honors Ray Young

Dr. Ray Young of Georgia Tech received an honorary doctoral degree from the Institut National Polytechnique de Toulouse in special ceremonies last month in Toulouse, France. Dr. Young is a professor of physics and head of the Applied Physics Branch of the Engineering Experiment Station's Electromagnetics Laboratory.

He was presented the honorary degree by Institut President Gerard Montel on the celebration of the University of Toulouse's 750th anniversary. The Institut National Polytechnique is part of the University, which is the second largest in France.

Dr. Young has been working at Georgia Tech since 1949 in the study of calcium phosphates. Calcium phosphates are used in fertilizers and fluorescent lights and are the principle constituents of bones and teeth. Young has been involved in various research activities in crystal physics, and in applications of x-ray, electron and neutron diffraction phenomena and complimentary techniques. His research work has revealed new facts about the atomic scale mechanisms of calcium phosphates. These facts are expected to result in better health care for bones and teeth.

Since 1966, Young's research in calcium phosphates has been closely aligned with French research in the same area.

### EES REPORT

**Peggy Simcic Brönn — Editor**

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## EES Reorganizes

The Engineering Experiment Station has been reorganized from six to 11 laboratories effective July 1, 1979.

Dr. Donald Grace, director of EES, says that the reorganization is the result of a careful review of the Station's growth rate, which has averaged about 30 percent per year. He adds that under the new organization laboratories can work together more effectively to sort out technical operations while promoting growth over the next several years.

The laboratories have also been divided into two major research areas—resources and electronics. Rudy Yobs is the associate director responsible for the five resource labs and Dr. James Wiltse is associate director responsible for the six electronics labs. Howard Dean is associate director responsible for financial and resource planning and new program development.

The resource laboratories and their directors are: Chemical and Material Sciences Lab, Dr. Jack Spurlock, acting; Economic Development Lab, David Clifton; Energy Research Lab, Dr. Robert Cassanova; Engineering Extension Lab, Dr. Gerald Hein; and Technology Applications Lab, Richard Combes, acting.

The electronics laboratories and their directors are: Computer Science and Technology Lab, Edith Martin; Electromagnetics Lab, J. W. Dees; Electronics Technology Lab, D. W. Robertson; Radar and Instrumentation Lab, Dr. E. K. Reedy; Systems Engineering Lab, R. P. Zimmer; and Systems and Techniques Lab, R. M. Goodman.

## Tech Report Recommends FCC Alter Regulations

An elimination of Federal Communications Commission regulations on certain technical aspects of radio and television stations could lift a significant amount of costs from broadcasters, according to a recent study by EES's Electronics Technology Laboratory.

In a "Broadcast Regulation Trade-Off Study," researchers estimated that radio and television stations annually spend about \$200 million to verify and demonstrate compliance with the FCC's technical requirements. The study team included Richard Moss and Robert Rice of ETL's Communications Systems Branch. It was funded by the FCC.

In the report, presented to the FCC in June, Moss and Rice told Commission members that if unnecessary regulations were deleted or modified, the \$200 million in compliance costs could be reduced significantly. They added that the amount would not go to zero because of other activities such as maintenance programs that are viewed as necessary by the broadcasters themselves.

The team recommended that the FCC stop regulating the "how-to" technical aspects of broadcast station operations. Examples were logging, performance checks, and the verification of qualifi-

cations of technical personnel by operator licensing.

The report says that the Commission's current technical logging requirements are not necessary to assure signal quality or to prevent interference. In regards to performance checks, it says that monitoring is an effective and relatively inexpensive way of verifying compliance with FCC regulations regarding signal transmission. On-site inspection, it adds, is effective but expensive.

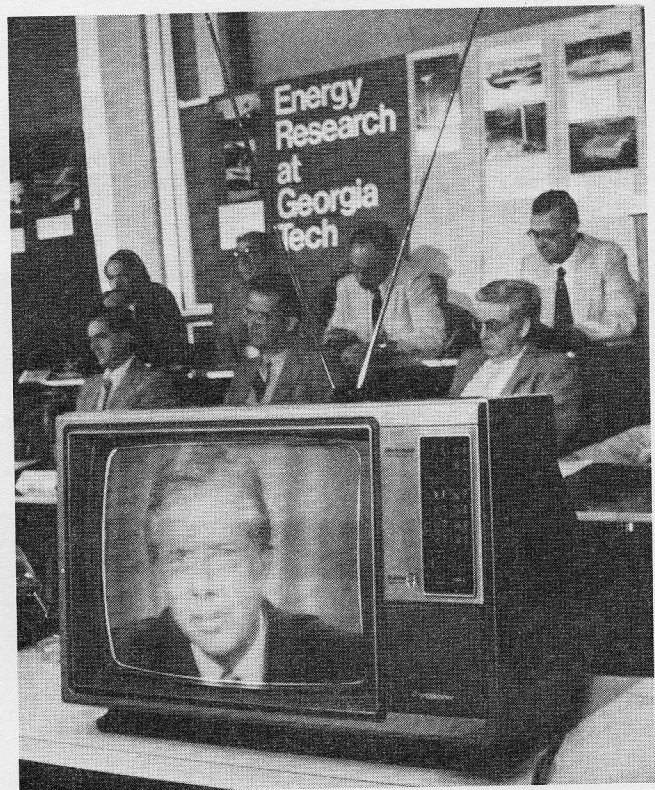
## Panel Critiques President's Speech

A panel of Georgia Tech energy experts and economists were invited to comment on President Carter's energy programs at a news conference on the Tech campus following the president's speech last month.

The general consensus was supportive of the proposed programs but some concern was expressed.

Dr. Thomas Stelson, vice president for research, said that the president demonstrated good, clear leadership that has been long overdue in energy-related matters. He predicted, however, that if voluntary conservation does not work, the nation would have gasoline rationing by the summer of 1980.

Solar researchers from Tech were pleased with Carter's commitment to a 20 percent dependence on solar energy by the year 2000. J. D. Walton, international solar energy expert, added, however, that there will be a difficult period of transition from an era of massive petroleum consumption to use of alternate fuels.



Georgia Tech experts listened to President Carter's energy speech before answering media questions.



*Dr. Thomas Stelson, far right, and Dr. James Schlesinger discuss a point with Hugh Carter, special assistant to President Jimmy Carter.*

## **Stelson at White House For Solar Ceremonies**

Dr. Thomas Stelson, vice president for research, was in Washington, D.C., last month at the invitation of President Jimmy Carter.

Dr. Stelson, who is a volunteer consultant to outgoing Secretary of Energy Dr. James Schlesinger, participated in ceremonies conducted by President Carter to dedicate a solar heating system on the White House roof. At the ceremonies, Carter announced a national goal of meeting 20 percent of the nation's energy needs with renewable resources, primarily solar power, by the year 2000.

A nationally-recognized figure in solar energy research, Dr. Stelson shared the president's optimism. "Solar energy is the newest, most rapidly growing, most unknown area of energy and probably the most significant," Stelson said.

Dr. Stelson also pointed out that many third world countries are ahead of the U.S. in solar energy applications. But he views Tech's research efforts in solar energy and biomass as one reason the U.S. could meet President Carter's projections by the year 2000.

## **New Computer Language Introduced at Tech**

Georgia Tech was selected as the only non-military installation in the U.S. to give a course on a new Department of Defense computer language.

The week-long course gave more than 100 industry representatives the opportunity to learn the new language, which is called "Ada." Steve Cole, chief of the Software Research Division, said that Tech was chosen for the location of the course because of its involvement in military computer applications, particularly the Military Computer Family program.

Ada has been selected as a DOD programming language which will become a standard for future applications of computers used in military systems such as tanks, airplanes and weapons systems.

Representatives from companies such as Sperry Systems Management, McDonnell Douglas Automation, and Hughes Aircraft Company, which design hardware for DOD, tested and evaluated the new language during the course. Their comments were directed to DOD to aid the process of refinement and debugging of the new language.

The language was developed by Honeywell's Systems and Research Center in Minneapolis and by Cii Honeywell Bull of Paris, France. It was named after Ada Augusta Byron, Countess of Lovelace (1815-1852), who is known as the first computer programmer because of her pioneering work in using the Babbage machine, the mechanical forerunner of today's computers.

Jean Ichbiah of Honeywell Bull says that Ada promises to substantially change programming and communications for the better. "Languages in use today—BASIC, COBOL, FORTRAN—were developed in the 1960's. Many new developments have been made and Ada incorporates those plus many new ones. Ada will be known for its reliability, readability, and maintainability," Ichbiah says.

Similar courses were held at West Point, the Air Force Academy in Colorado Springs, the Naval Post Graduate School in Monterey, Calif., and the National Physical Laboratories in Teddington, Middlesex, England.

### **EES Report ENGINEERING EXPERIMENT STATION**

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