

# EES Report

ENGINEERING EXPERIMENT STATION • GEORGIA TECH

*Serving Georgia and  
the Nation*

## Energy Costs Forecast Makes Energy Efficient Homes Better Buy

Imagine your monthly utility bill equaling your monthly mortgage payment.

This is exactly what will happen to the average home owner if trends in current energy costs continue, says Tom McGowan of the Technology and Development Lab.

Based on the utility companies' estimates that, for the foreseeable future, energy costs will increase by ten percent per year, the Tech engineer predicts that in 13 years the owner of a standard-size all electric home can expect to pay, on the average, \$374 per month for utility bills — the amount of the average monthly mortgage payment for a home this size. The owner of the gas heated standard home has 19 years to wait until the utility bill equals the mortgage payment. These figures are for a standard, 1600 square foot home in Atlanta built without energy conserving features.

Of course, as McGowan points out, there are many energy conserving features now on the market that can be added to older homes. These products guarantee to reduce utility bills and McGowan agrees that most of them do the job — many for the prohibitive cost.

To avoid getting into the high utility bill bind in the first place, McGowan says the thing to do is to purchase a home that has been constructed with energy conservation in mind — what McGowan calls a total energy package.

The engineer explains that a home built with energy conservation in mind is one that has been tightly constructed. The home is tightened up in all the common weak spots in order to produce energy savings and provide comfort to the owner.

"A home built with a total energy package can save the owner more than 50 percent on monthly utility bills for a cost of less than three percent of the home's selling price," says McGowan.

For an Atlanta area homebuyer, McGowan calculates that the initial installation of energy conservation features in a standard-size house can save about \$56 per month for an all electric home and \$43 per month for a gas heated home. This is a cost of less than \$1.00 per square foot or approximately \$13.00 per month on the mortgage bill.

Included among the energy conserving features McGowan says make up an energy package are:



EES participated in the 3rd Annual World Fair for Technology Exchange held in Feb. at the Atlanta World Congress Center. Wrapping up the week's activities are (l to r) Chairman Don Lodge (IPO), EES Director Don Grace and Jack Spurlock (ASL). "This venture," according to Don Lodge, "provided EES the opportunity to present its varied stock of technological aptitudes to a world-wide audience."

more insulation; less air leakage; better glazing and doors; more efficient heating and cooling equipment; and proper orientation and shading of the house.

In an effort to educate local home builders on constructing and marketing homes with energy conserving features, McGowan, in cooperation with the Home Builders Association of Georgia, is conducting a series of Statewide builders workshops.

Funded through the Georgia Office of Energy Resources, these workshops will give home builders and their lenders, appraisers, sales people and subcontractors a chance to study new energy saving devices, new construction techniques and the effect of energy costs on the home buyer.

For further information on building or buying homes with energy conservation in mind, contact the local office of the Home Builders Association.

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## Structural Steel Paint Under Study

The Transportation Research Board of the National Research Council has awarded a \$150,000 contract to EES for a nationwide study of coating systems for painting old and new structural steel.

According to the principal investigator, Dr. Daniel J. O'Neil, the 27-month project will be the first comprehensive study since 1968 of existing and recently developed paint and coating systems for corrosion protection of structural steel. The results of the study will be used to establish guidelines for manufacturers and users, especially highway departments, of steel coatings.

O'Neil indicated that millions of dollars are spent each year by highway departments for the maintenance of bridges, culverts, guardrails and other steel structures and that there is wide variation in the selection and use of paints by the different states. With stiff environmental regulations in effect in California, and being proposed by OSHA and EPA, new paint systems which meet health and environmental criteria must be identified. Since exposure conditions vary widely in the U.S., it will be necessary to specify coatings on the basis of categorized environmental zones.

One phase of the study will involve experimental testing of potentially usable coatings in a coastal zone in Brunswick, Georgia.

In addition to establishing guidelines, the EES study will have an objective of identifying areas and priorities for future research in the United States for coatings of structural steel.

The project team includes W. H. Burrows, F. A. Rideout and E. M. Dannenberg, all of EES.

## Regional Science and Technology Conference

The Georgia Institute of Technology hosted a Southeastern Regional Conference on Science and Technology for Development January 16, 1978.

Attending were representatives of a wide variety of public institutions and nongovernment professional and public interest groups from eight states: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee. They brought to the conference their ideas on how U.S. science and technology might be mobilized in support of international development and to improve the lives of people in developing countries.

One of four such regional conferences held in January, it is an important part of the United States Government's preparation for participation in the 1979 United Nations Conference on Science and Technology for Development. The U.S. State Department has asked the National Research Council (NRC) to conduct a study and prepare a report that will assist the government in writing a national paper for the U.N. meeting. In order to obtain the widest possible input, the NRC is convening these regional meetings.

Five panels of specialists will sift the testimony from the regional meetings and present a final report

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to the State Department by April 21, 1978. The report will identify the key areas for priority action in the following sectors:

- population, health, nutrition
- energy, natural resources, environment
- food, climate, soil, water
- employment, industrialization, trade
- urbanization, transportation, communications

The report will stress ways to build developing countries' own scientific and technological capabilities in these sectors and to expand their access to U.S. and world capabilities in order to improve their living conditions.

The Southeastern Regional Conference was organized by Georgia Tech's Office of International Programs.

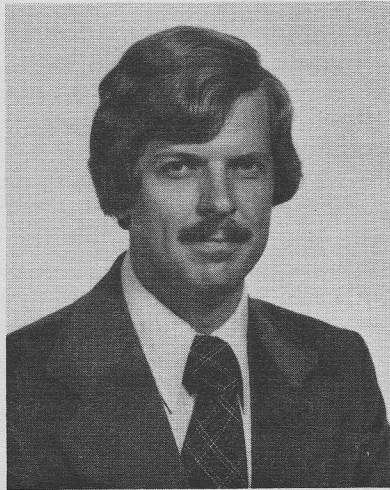
## Broadcasters Enlist Georgia Tech to Improve UHF TV Antenna Performance

Buying a good UHF TV antenna has been mostly luck in past years. A buyer has had but two guidelines: the salesman's word and the assumption that the higher the cost, the better the antenna. Georgia Tech's Engineering Experiment Station has been commissioned by a group of broadcasting organizations to help solve the problem.

An EES project which will aid both consumer and manufacturer by providing guidelines and measuring performance of a variety of UHF antennas is being sponsored by a coalition of Public Broadcasting Service, Corporation for Public Broadcasting and the Council for UHF Broadcasting (CUB), which represents these three organizations and also the National Association of Broadcasters, the Association of Maximum Service Telecasters and other industry organizations.

The importance of UHF to the future development of American television is so crucial, according to broadcasters, that a project of this nature has long been needed. Over 60 percent of public television is now on UHF channels, and future commercial stations are facing the prospect of depending on UHF frequencies. To gain viewers, improved performance of UHF antennas is crucial. Currently, there are few, if any, guidelines for consumers as to UHF antenna performance under local conditions with locally available channels.

According to project director William Free, "The broadcasting industry is depending on the program to provide guidance and support in establishing standards which are technically sound and uniform for measuring performance of UHF receiving antennas. With advancement of technology today, there is no need for consumers to be at the mercy of salesmen or to buy a product using an outdated assumption. The Experiment Station's 25 years of expertise in the antenna field makes this program a natural for Georgia Tech."



David S. Clifton



Dr. Tze I. Chiang

## Tech at Work on Timber Process and Wood Energy

Research scientists at EES are working on separate but related studies of direct concern to Georgia's timbers industry.

The initial research project consists of two tasks. Task I is to investigate the feasibility of establishing a timber processing complex in the North Georgia Appalachian area in order to take the advantages of ample timber supplies and low stumpage costs prevailing in the area. The main research objectives under Task I are to: evaluate timber resources in the North Georgia Appalachian area, assess the availability of timber to the proposed processing complex, determine the product mix of the complex and investigate market potentials for selected product mix. It will also provide cost data on investment requirements and determine production costs and returns.

The second task study is to investigate the potential markets for wood fuel based on new developing technologies. The main research objectives under Task II are to: evaluate the results of "technical and economic feasibilities" based on new

technologies which will be studied under a separate research project; investigate potential markets for wood fuel in industries, commerce, residence, utility and institutions; assess potential market barriers; and investigate investment incentives and tax incentives for promoting wood fuel.

According to the project director, Dr. Tze I. Chiang, and the project coordinator, David S. Clifton, Task II will be integrated with a separate study concerning a proposed wood energy center in Georgia. This separate study will define the mission of the Wood Energy Center, especially as it will interact with the Georgia Forestry Commission, the Georgia Office of Energy Resources, the U. S. Forest Service, and other state, regional and federal agencies. The organization of the Center will be determined, based on projected administrative, technical and functional requirements.

The plan will identify the Center's role in assessing the impact of increasing fuelwood utilization on the environment, society and industry. As the final phase of the pilot Wood Energy Center implementation plan, EES will define procedures for ongoing internal program evaluation, with special emphasis on the pilot nature of Center operations.

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## National Energy Survey Conducted

Working with an \$80,000 grant from the U.S. Department of Energy (DOE), EES is conducting a nationwide survey of energy use in the electroplating industry.

According to Dan Mazzeo, project director, the DOE grant is in response to the American Electroplaters Society's concern over energy conservation in the industry. The Society is a national trade organization made up of management from the electroplating business.

Mazzeo explains that the electroplating industry does not know how much energy it can save because it does not know how much energy the various plating processes use. "Up to the present

time," Mazzeo says, "no concentrated effort has been made to determine how much energy is used or wasted by some of the plating processes."

Some potential areas of energy savings that the industry is already aware of include the dryer ovens and the cleaning, rinsing and plating tanks.

In order to make the industry-wide evaluation, Mazzeo will visit several electroplating shops around the country and measure the amount of energy used by each shop in the various processes. From this data, EES engineers will be able to make recommendations to the industry regarding where reductions can be made in fuel consumption.

The DOE project is part of a national effort to demonstrate energy conservation measures that can be employed by industry to save energy.

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## **Cost Benefit Of NASA Remote Sensing Technology For Georgia Being Analyzed**

NASA has been developing remote sensors for determining characteristics of earth and space environments for many years. These programs have produced numerous sensors which have shown promise for satellite applications. One is a multispectral scanner found in LANDSAT (formerly Earth Resources Technology Satellite). This type of satellite together with the technology for processing the remotely sensed data offer a variety of uses that are of public benefit. Applications include: crop production, estimation/agricultural potential; white tailed deer habitat assessment; erosion hazard/tree forest station needs and others. Such information can improve decisions related to widespread resource management.

To help justify NASA's various programs based on cost-benefit information, there is a need to determine the first order cost-benefit of the application of remote sensing technology developed by NASA and transferred to the State of Georgia and to extrapolate the results to a regional basis. In 1975 the state of Georgia, in conjunction with the Earth Resources Laboratory of the NASA/Johnson Space Center, made a decision to commence a system for processing multispectral scanner data. This system includes the data processing system of the joint Georgia Tech-Georgia Department of Natural Resources-NASA program being carried out by the Electromagnetics Laboratory of the Tech Engineering Experiment Station.

The team of researchers at the EES, led by R.P. Zimmer, Chief of the Systems Engineering Division, is comprised of personnel from the Systems Engineering Division and the Electromagnetics Laboratory. They have a combined background in the disciplines that are necessary to carry out the program.

The research program is aimed at determining the

first order economic effectiveness of present and projected applications of the technology. It consists of carrying out a sequence of steps that are similar to other cost-benefit analysis that have been conducted by Georgia Tech.

The technology includes an interactive, spatial, data base manipulation system for Georgia. Although the main effort in the transfer of technology effort has been the development of a LANDSAT digital processing system in Georgia, a secondary effort has been underway for the last two years to determine the way that LANDSAT digital data may be integrated into a data base modeling system supported by soils, geology, hydrology, economics and other sources of data that can be located spatially. The cost benefit analysis addresses the integrated data base with and without LANDSAT derived data.

Extensive government expenditures characterize today's economics. The governments of advanced economies spend for; national defense, for diverse social projects such as water resource development, transportation networks, manpower training and technology transfer and assessment. The members of these economies, enjoying a relatively high consumption of goods provided by private enterprise (food, shelter, clothing, etc.), have turned largely to the public sector to satisfy additional needs.

Not enjoying high standards of living, the less developed nations have determined that a way to achieve prosperity quickly is to develop their "social infrastructures" (communication and transportation systems, pools of skilled labor, education and cultural facilities, etc.) The governments of these countries take the lead in sponsoring projects to meet these ends. Thus, for varying reasons, public spending is becoming increasingly more important around the world. With resource scarcity becoming more severe every year, governments are compelled to employ cost benefit analysis in order to choose wisely the projects they wish to undertake.

## **An Equal Opportunity and Educational Institutional**

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

Georgia Institute of Technology  
Atlanta, Georgia 30332  
(404) 894-3411  
Dr. D.J. Grace, Director  
J. A. Donovan, Editor

Nonprofit Organization  
U. S. POSTAGE  
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Atlanta, Ga. 30332  
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