

HIGHLIGHTS and INITIATIVES



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The EERC conducts unbiased,
analytical, and multidisciplinary
research designed to promote real-
world solutions to problems in the
fields of energy, environment, tech-
nology, and economic development.


COLLABORATIONS. To protect threatened and endangered species and stream-side habitats from invasive pest plants in the southern Appalachian region, the Waste Management Research and Education Institute (WMREI) is conducting a series of workshops in cooperation with SAMAB (Southern Appalachian Man and the Biosphere), the National Forest Foundation, the Appalachian Trail Park Office, and the Tennessee Exotic Pest Plant Council, along with several communities and government agencies. EERC Research Ecologist **Jack Ranney**, who is helping to coordinate the workshops, is also training volunteers to identify, inventory, and control pest plants. Their findings, which will be posted on the Internet, will expose invasive-plant threats and arm communities with information that will help them control such plants and develop effective pest-plant ordinances.

Under the auspices of EERC's Center for Clean Products and Clean Technologies, Research Scientist **Don Huisingsh** is helping Monterrey Tech University (Monterrey, Mexico) to implement sustainable development (SD) throughout its program and across its 34-campus network. **Huisingsh** and Francisco J. Lozano-García, a colleague at Monterrey, coordinate efforts to weave SD concepts into Monterrey Tech's courses and ensure that disciplinary and interdisciplinary research, as well as campus physical facilities, adhere to SD criteria. **Huisingsh**, a cleaner-products specialist and editor of the *Journal of Cleaner Production*, also prepares reports on Tech's sustainability plans and programs and organizes SD "Educate-the-Educators" programs for Tech and other universities worldwide.

PROJECTS. In September, Senior Research Scientist **David Feldman** served as keynote speaker for *Moving Waters: The Colorado River and the West*, at Northern Arizona University, Flagstaff. **Feldman's** address was titled "Covenants, Categorical Imperatives, and Stewardship Ethics: Are There Sound Alternatives to Utilitarianism for River Basin Management?" The Arizona Humanities Foundation and the National Endowment for the Humanities sponsored the conference. **Feldman** also convened a panel, "The State of Affairs: Challenges Facing Southeast and Gulf States in the 21st Century," as part of *When the Water Runs Dry: Maintaining a Balance between Human Water Use and Environmental Needs*. This conference, held in New Orleans, was sponsored by the Mott and Turner foundations and EPA Gulf of Mexico Program. **Feldman** and graduate student **Lyndsay Moseley (Political Science)** also presented "Faith-based Environmental Initiatives in Southern Appalachia," at the *American Political Science Association Annual Meeting* in Boston.

A new Campus Recycling Committee has been formed at the direction of UT Provost **Loren Crabtree** and Vice President **Phil Scheurer**. EERC Executive Director **Jack Barkenbus** and student intern **Sarah Surak (Political Science)** were chosen to serve as co-chairs of the committee, which is tasked with recommending an expanded campus recycling system. Senior Research Associate **Catherine Wilt**, former president of the National Recycling Coalition, is also a member of the committee. Committee members hope to forward recommendations to the administration by year's end.

How Much Bang for the Buck?

 Each *Highlights and Initiatives* back page presents an in-depth look at one of EERC's projects or activities. This edition focuses on a recent study to determine whether the federal government's investments in energy research are really paying off.

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How Much Bang for the Buck?

*Do the federal government's investments in energy research pay off?
A UT/ORNL research team says yes.* • BY DAVID BRILL

EACH YEAR, the U.S. federal government spends billions of dollars on research and development (R&D) in areas spanning defense, energy, the environment, agriculture, and human health. In fact, the government spent \$85 billion on *energy research alone* between 1978 and 1999.

The Automotive Lightweighting Materials (ALM) Program, part of the Department of Energy's Office of FreedomCAR and Vehicle Technologies, is one recipient of such funds. The advanced lightweight materials used in ALM projects can significantly reduce the weight of vehicles without compromising safety, performance, recyclability, or cost. Less weight means improved fuel efficiency.

But how much of the money invested in such programs actually produces results? That's a critical question, according to EERC Research Scientist **Jean Peretz**, because payoffs come in many forms.

Peretz, along with Oak Ridge National Laboratory (ORNL) researcher Sujit Das and planner **Bruce Tonn** (professor, **UT Department of Urban and Regional Planning**), recently evaluated three ALM projects.

One project sought to improve design and production of lightweight, high-strength cast-aluminum components for auto chassis and interiors. A second set out to reduce the tooling time required to create molds, or dies, for casting aluminum components. The third sought to improve the durability of such composite materials as fiberglass and carbon fiber used in cargo boxes and pick-up trucks.

In evaluating these projects, the research team relied on *qualitative assessments*, based on participants'

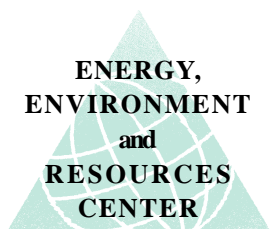
estimations of project benefits; *economic assessments*, based on benefit-cost analysis; and *National Research Council indicators*—such as how many publications and presentations a project produces—for evaluating R&D project success.

For the benefit-cost analysis, the researchers estimated market penetration of the technologies developed by the projects and calculated the resulting monetary benefits in energy efficiency, environmental protection, and energy security—then divided those numbers by project costs to reach a benefit-cost ratio. Considering that a benefit-cost ratio of 1 is deemed marginal but acceptable, the three projects performed very well.

The researchers calculated ratios ranging from base case (lowest level of market penetration of the technologies) to high case (highest level of market penetration). In the moderate-case scenario, the cast light metals project achieved a benefit-cost ratio of 69, the rapid-tooling project achieved a ratio of 211, and the composite materials project achieved a ratio of 63. The three projects also produced 111 presentations and 64 publications over four years.

“We assumed that the primary benefit of each project was to bring new technologies to the automotive market,” which, when commercialized, produce measurable secondary benefits such as reduced energy use and reduced emissions, says **Peretz**. “We knew intuitively that much good had come from the federal investment in energy research, but the level of benefit often remains unknown. Studies like ours can help the federal government quantify the benefits of R&D.” •

“When commercialized, [new technologies] produce measurable secondary benefits such as reduced energy use and reduced emissions.”



For more information on the team's findings, contact Jean Peretz, EERC, The University of Tennessee, 311 Conference Center Building, Knoxville, TN 37996-4134, call 865-974-3803, or email <speretz@utk.edu>.