

ENERGY

Janet Raloff reports from the fifth Energy Technology meeting in Washington, D.C.

They don't burn it like they used to

A combined-cycle (gas turbine and steam turbine) electric-power generator using a fluidized-bed coal devolatilizer (which also makes coal anti-caking) and fluidized-bed coal gasifier can increase a coal plant's potential generation efficiency 10 percent over conventional plants with scrubbers, says John Yasinsky of Westinghouse Electric Corp. in Madison, Pa. Three years of testing, lately with "excellent" performance, have demonstrated: high gasification rates, effective ash separation from gas, gas with little or no tar, and the ability to use coal of any type or particle size. Future tests will look at optionally producing medium-btu, instead of low-btu, gas.

Hydrogen homestead in Utah

People have been touting the virtues of hydrogen as a fuel for years; demonstrating those virtues with operating systems is another story. In 1973, Roger Billings created the Billings Energy Corp. in Provo, Utah, to do just that. Last November he unveiled his hydrogen homestead, the 25-room home in which he now lives, replete with a hydrogen-fueled range, water heater, barbecue and gas log (for the fireplace). The garden tractor runs on hydrogen as does his modified Cadillac Seville — the latter is able, at the flip of a switch, to run alternatively on gasoline, according to Billings's vice president, Richard Hartley. A surrounding 30-home subdivision — also to be hydrogen powered — is under development.

An electric heat pump provides space heating, with a hydrogen-powered backup system. Billings's electricity is now generated by a public utility, but he plans to convert to on-site solar-, wind- or hydroelectric-generated electricity within the next two years.

The homestead's hydrogen is generated in an electrically powered electrolysis system and stored in metal hydrides. However, hydrogen from coal gasifiers should only cost one-half to one-third as much, and is, in fact, the type expected to eventually fuel the future homestead community, Hartley says.

Growing energy

The Bio-Energy Council in Washington is compiling a cross-referenced world registry of research for publication within a few months, according to its executive director, Paul F. Bente. Among 250 programs already entered are several conventional offshoots of agricultural research.

For example, Ontario's Ministry of Natural Resources is growing test plots of hybrid poplars. Trees with trunk diameters of eight inches have been grown in only five years, Bente says, a quadrupling of the normal trunk size. Domtar Woodlands, Ltd., of Ontario, which has begun planting such poplars, may eventually supply its nearby paper mill with only 14 percent of the forest land now required, Bente says.

The Agriculture Department's Paul Koch in Pineville, La., has developed a mobile chipper to roam forests, chomping whole trees to wood chips. His mobile extractor pulls whole trees out at a rate of one or two per minute, Bente says.

Less conventional programs also show promise. For example, Melvin Calvin of the University of California-Berkeley's Laboratory of Chemical Biodynamics is growing "petroleum plantations" of gopher plants (*Euphorbia lathyris*). He estimates eventual yields of 10 barrels of oil per acre per year, which can be refined, even used as chemical feedstocks.

Calvin estimates hydrocarbons can be grown today for \$20 per barrel. If the yield can be doubled or tripled and the extraction process improved, per-barrel costs would approach current crude-oil prices, he says.

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SCIENCE & SOCIETY

From the American Association for the Advancement of Science's annual meeting in Washington, D.C.

The state of academic science

"The scale, vigor and creativity of American science are outstanding but the signs of trouble for the future are unmistakable. Deterioration may well proceed long before the matter becomes a public issue," said Bruce Smith of Columbia University and Joseph Karlesky of Franklin and Marshall College, based on their extensive analysis for the National Science Foundation (SN: 6/11/77, p. 373).

Several trends are already in motion, Karlesky says:

- Terms and conditions for obtaining and maintaining research grants are "more cumbersome," thereby requiring that more time and money be spent on administration.
- Greater obstacles confront young scientists pursuing tenure-track positions.
- Money for major supporting research equipment declined from 1965 to 1975. In the past two years there has been an upswing in the trend, but Karlesky says it's too early to tell whether it will continue.
- The notion that top-ranked institutions and departments are losing money and people to lower-ranked institutions is "a myth." In fact, data suggest the very top-ranked departments have gotten better in the last decade, he says.

Uncertain status of some researchers

One way for young researchers to enter the tightening academic job market is as a full-time researcher in an "organized research unit" — a laboratory, institute or program outside traditional academic departments. In a draft of his report to the National Science Foundation, Albert Teich of George Washington University discusses the role of ORU's and their researchers.

Among his observations was the finding that a status differential, which "can often be measured in terms of money, privileges, and, especially, job security [ability to gain tenure]," exists between full-time doctoral researchers in ORU's and departmentally affiliated teaching faculty. ORU researchers receive "the image — and in some senses the reality — of a second-rate career. This does not mean that individuals on the research track are necessarily any less capable or accomplished ... although such a belief appears to be prevalent throughout the academic community."

Teich says that although there are an estimated 5,000 or more ORU's in this country, 800 doing physical science or engineering, "little or no serious thought seems to have been given to what it might mean to universities if ORU's — whether by natural processes or by conscious policy choice — were to assume a substantially larger research role relative to academic departments." Teich tentatively concludes that unless positions and advancement offered ORU researchers "becomes the true equivalent of the teaching faculty ladder ... the trend seems bound to create a formally two-tiered academic world."

Science in the state

More state legislatures are acquiring technical staffs to aid in technical decisionmaking and policy, and to counter the feeling of "domination" by governors' offices (which formerly had the only in-house technical aides), says Willie Jacobson of the Minnesota Legislature Science and Technology Project. A key to the Project's acceptance has been interactive briefings (not lectures) and one- or two-page data sheets on topics suggested by congressional inquiry, she says. The state's short sessions, however — five months one year, three months the next — make it hard for her office to prepare for, and legislators to "cram" for, the increasing number of technical issues they must confront each term, she says.

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