

# ENERGY

## Teller on energy

As part of a study project sponsored by Nelson Rockefeller's Commission on Critical Choices, physicist Edward Teller has prepared a provocative report he calls "Energy, A Plan for Action." His conclusion is that the United States can either remain dependent on foreign oil imports and spend \$600 billion—most of it going to foreign producers—or it can launch a massive \$800 billion investment program and become an energy exporter by 1985. Teller offers unique suggestions on some of the most controversial energy alternatives:

**Nuclear reactors.** By locating reactors 200 feet underground or in submarine hulls undersea, "safety may well be increased to such an extent that insurance through normal channels . . . would become feasible."

**Breeders.** "Claims to the effect that sooner or later the LMFB [Liquid Metal Fast Breeder Reactor] will become unavoidable are unproven." As an alternative, substitute fuels, such as thorium, could be used in conventional reactors, after some modification. (The thorium transmutes into uranium 233 and the overall fuel savings may be as high as 90 percent.)

**Electrical storage.** Nighttime power requirements are typically 40 percent below peak daytime requirements. Storing electricity at night by using the extra power to crank up giant flywheels holds "great promise" if new, durable flywheels can be made from inexpensive fiber composites.

**Solar energy.** Capital costs must be reduced by a factor of 10 before solar power generation is practical. "Effective imitation of photosynthesis in the test tube might result in a revolutionary change in the utilization of the energy of the sun," but massive expenditures on research are not now warranted.

## Demand elasticity and all that

Buried deep within the highly technical testimony of Environmental Policy Center analyst Marc Messing, given before the Senate Interior Committee hearings on energy facility siting, is an interesting and possibly profound notion: Current projections of future energy needs are based on possibly obsolete econometric models germinating from data gathered in what was probably a period of atypical energy growth.

For one thing, the models assume that electric energy will continue to be substituted for other forms (e.g., in heating houses) and that increases in the Gross National Product are closely proportional to increases in total energy consumption. In fact, Messing points out, the ratio of total energy consumption to GNP has decreased sharply, if one looks at a 40-year trend instead of the energy-extravagant late 1960's. Furthermore, the old idea that people would increasingly use electricity despite its inefficiencies may change now because of rapidly rising prices. As prices rise, people become aware of more efficient alternatives. Concludes Messing, "Since the 1973 oil embargo, energy resource costs have risen to the level at which demand appears to be price-elastic."

## Consumers do respond

Residential consumers responded to the energy crisis by reducing their gas consumption by 12 percent and their electricity consumption by 6 percent, according to a survey conducted by Lawrence S. Mayer and Jeffrey A. Robinson of Princeton's Center for Environmental Studies. The authors say their study is the "first rigorous demonstration of this effect," though others have also said energy prices have risen high enough that people are responding by turning down their thermostats and air conditioners. The study was conducted in Twin Rivers, New Jersey.

JUNE 7, 1975

# AGRICULTURE

## The view along the Yangtze

During Neolithic times, while most Europeans were still nomadic, a thriving agricultural civilization grew up in China along the vast, fertile plain stretching from the Yellow River in the north to the Yangtze in the south. Nearly a quarter-century has now passed since Western scientists have been allowed to study progress in this productive, but often troubled area, where regular floods and periodic droughts created a cycle of feast and famine. Then, late last year, a delegation of distinguished American plant scientists was invited to visit China. Their report has just been published by the National Academy of Sciences.

"Crops generally looked good wherever the team traveled," says the report. Crop yields have been stabilized through extensive land-leveling, irrigation and flood control; the Chinese have developed their own high-yielding varieties of rice; and modern farming methods (including extensive use of chemical fertilizers and rural electrification) are evident throughout the country.

The secret of this rapid progress has been the diversification and decentralization of the research and educational effort. Researchers, for example, must spend about one year out of three working with the peasants in the countryside as extension agents. Production has increased greatly at the local level, but the report concludes that advanced research and education has suffered.

Chinese agricultural scientists were frequently out of touch with potentially beneficial advances from abroad, and the team found that researchers in one province might not even know what work was being done in other provinces. The report notes that reorganization of science and education is still going on. It concludes: "China's agricultural progress during the balance of this century will depend in large part on the ability to reconstruct scientific and educational institutions in such a way that new scientific and technological information and materials are produced in a highly effective way, and new generations of highly capable researchers and teachers are trained in substantial numbers."

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The team was led by Sterling Wortman, a vice president of the Rockefeller Foundation, whose personal reminiscences of the trip are reported in the foundation's house organ *RF Illustrated*.

"I'm going to worry less about whether the country can feed its people," Wortman says; "I didn't see a bad field of rice in all of China." But the problem of research is particularly acute in the area of plant pathology and plant physiology, he says. Also, the genetic variety of the newly developed hybrids is dangerously narrow. As for agricultural education, "Most of the highly trained people are in their sixties—and too few young people, it seems, are being trained."

Could the West adopt some of the practices that have increased production so dramatically in China? Perhaps, but only where there is plenty of cheap labor: "You might say there's very little 'farming' in China," says Wortman; "most everything there is gardened. . . . The Chinese use incredible amounts of skillful hand labor."

## Saudi desert to bloom?

Saudi Arabia covers an area about the size of the United States east of the Mississippi, yet its arable cropland is no larger than Delaware. More than a third of this land is irrigated and, according to an article in the May 19 *FOREIGN AGRICULTURE*, the Saudis plan to use a good portion of their new-found oil wealth to increase irrigation, including expensive desalinization plants along the Red Sea and the Persian Gulf. Irrigation water is provided free to farmers.

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