21 September 1979, Volume 205, Number 4412 **SCIENCE**

Progress on Many Energy Fronts

Those who are concerned about the energy future of the United States would have found encouragement during a symposium at Georgia Institute of Technology on 29 August. The meeting was attended by President Carter and some key members of his Administration. It was organized by Frank Press, the President's science adviser. Ten leading experts from industry, government, and academia made presentations and answered questions on virtually every important aspect of energy conservation and production. Although no major breakthroughs were announced, the atmosphere at the symposium was upbeat, with progress reported on many fronts.

Higher prices of imported oil have painful effects, but they have improved the economic outlook for investments in conservation, solar energy, unconventional natural gas, and recovery of heavy and tertiary oils. Price increases have also served to convince many voters that this nation really does have energy problems. President Carter mentioned telephone conversations that he had recently with congressmen visiting their home districts. They report a greatly increased public awareness and a much improved climate for congressional action.

A notable example of successful conservation stimulated by economics has been in the performance of the chemical industry, which has achieved an improvement of 18 percent since 1972 in its energy use per unit product. Further progress is being achieved by better designs of new plants, by process changes such as replacement of distillation by liquid-liquid extraction, and by exploiting new catalysts that permit better yields and lower operating temperatures. Another example of conservation comes from the automobile industry. New cars already have 42 percent better mileage than 1974 models, and they will better 1974 by 100 percent or more by 1985.

A report on home heating and cooling was particularly gratifying. A combination of good insulation and solar heating has cut fuel bills to miniscule proportions in many examples. A key ingredient is window design with emphasis on catching energy from the sun in the winter and avoiding it in the summer.

The increased costs of oil have stimulated interest in and use of biomass for energy in the Southeast. Annual growth of trees in Georgia amounts to the equivalent of 6 quads, which is four times the total energy consumed in the state. A switch away from oil, which is beginning, would be beneficial to the economy of the region.

Higher prices for natural gas are resulting in much enhanced drilling of deep formations; they have also made unconventional sources of gas much more attractive. Thus the Devonian shales of the Appalachian Basin are being increasingly exploited. The gas-bearing tight formations of the Rocky Mountains are being more vigorously explored. The tantalizing potentials of the Gulf Coast geopressured zone are being assessed.

Higher prices have also stimulated greater efforts in the tertiary recovery of huge amounts of oil that are known to be in place but are left behind with the usual technology. An especially helpful development is the use of CO_2 injected into old wells. This gas dissolves in oil, swelling it and reducing its viscosity. Now under construction is a $600 million pipeline to carry gas from CO_2-producing wells in New Mexico to oil fields in west Texas.

Higher prices have also provided an incentive to evaluate the petroleum potential of an extensive reef structure that lies beneath the continental slope east of Atlantic City. The reef is part of a long structure that includes the highly prolific Mexican oil fields. Other topics in which progress was described included nuclear safety, photovoltaics, and synthetic fuels.

This nation faces a decade of uncertainty and danger with respect to imports of oil. But the oil producing and exporting countries have finally succeeded in awakening the public. They have stimulated the private sector to action. There is now reason to expect that the Congress and the Administration will act together to provide further incentives for energy progress.

—PHILIP H. ABELSON