environment

Using power-plant heat in cities

University of California researchers A. B. Makhijani and A. J. Lichtenberg claim that energy-conservation practices could reduce per capita energy consumption in the nation to 62 percent of current levels without damage to the standard of living. Power plants are particularly prodigious energy wasters, with fossil-fuel plants having a thermal efficiency of only around 40 percent

Sam E. Beall of Oak Ridge National Laboratory reported to the Intersociety Energy Conversion Engineering Conference in San Diego this week on work completed by him and Arthur J. Miller. It suggests that much of the now wasted heat from power plants could economically be used to heat greenhouses and apartment buildings in cities. Two modes are possible: Use of relatively low-temperature cooling waters from plant condensers and removal of partly exhausted higher-temperature steam directly from turbines.

A hypothetical new city with a temperate climate was designed around a power plant capable of supplying electricity to about 390,000 people. Industrial consumers of low-temperature heat and 200 acres of greenhouses near the power plant would use condenser cooling water. Three-hundred-degree turbine steam would be piped to residential and commercial areas for heating as far as 12 miles from the plant.

Cooking by the sun

Conventional heat sources for cooking are all polluting, because they involve fuel burning either at the site of the cooking or in a power plant. Solar stoves have been unattractive because they are unreliable and unwieldy or because they do not suit certain ethnic cooking styles.

Charles J Swet of the Johns Hopkins University's Applied Physics Laboratory reported this week on a new design for a solar stove which he says overcomes the liabilities of earlier models.

"A reflector, a parabolic cylinder, concentrates the incident solar energy onto a heat pipe for delivery to a conveniently located hotplate. The reflector follows the sun by rotating about the fixed heat pipe, which is parallel with the earth's axis. . . . The condensing hotplate may be used as a griddle or as the heat source for a variety of utensils."

Bacteriogenic sulfur pollutants

Sulfur compounds entering the air from biological sources are not often considered by air pollution researchers. D. C. Grey and M. L. Jensen report in the Sept. 22 SCIENCE that their studies of sulfur compounds in Salt Lake City air indicate that bacteriogenic sulfur compounds from river and lake bottom muds and marshes make a significant contribution to the total sulfur compound pollution in Salt Lake City air. The contribution may rival industrial sources during certain seasons. The two researchers are with the Laboratory of Isotope Geology at the University of Utah.

They say the bacteriogenic sulfur may amount to about 10,000 tons annually, 10 percent of that released by local copper smelters. The bacteria apparently reduce mineral sulfates brought into the Salt Lake Basin in streams.

earth sciences

U.S. (crust) is pretty unstable

Geodesists of the National Geodetic Survey have put together a map, based on measurements made over the past 100 years, showing vertical movements of the earth's crust in the United States. The first of its kind for this country, the map shows probable annual rates of movement over large regions.

The western mountain states are being uplifted by about one to five millimeters per year, as is much of the South. The region of greatest uplift is northern Wisconsin and Minnesota—10 to 15 millimeters a year. Most of the Atlantic and Gulf coasts are subsiding. In some areas, subsidence is alarmingly rapid. Samuel P. Hand, head of the Survey's vertical network division, says the Houston-Galveston area has subsided as much as five feet in 20 years. This rapid subsidence, and sinking in the Central Valley of California, are largely a result of removing oil, water and gas from the ground.

Hand also points out that though the map shows no vertical movements along the West Coast, the plains states and much of the East, that does not mean these areas are stable; there is just not yet enough information to define movements there. "In short, there may be no significant area of the country that is really stable."

Prospecting with gamma rays

Everybody knows the ocean floors are loaded with minerals. The problem is finding them. Underwater television is being used to find manganese nodules, and magnetometers and acoustic profiles help in the search for other minerals. But frequently undersea prospectors must resort to the time-consuming method of bringing up sediment samples from various locations and analyzing them.

Vincent C. Rose and L. Donald Maus of the University of Rhode Island are developing a method of determining the composition of sediments quickly and inexpensively by using gamma-ray backscattering. A probe lowered to the ocean bottom would contain a radioisotope source of gamma rays and a detector to receive the gamma photons scattered by the sediments. Both the density and the atomic number of elements comprising the sediments could be determined from the amount of backscatter.

The ocean engineers haven't decided on the design of the equipment, but are certain it can easily be constructed.

Ocean crust without the ocean

Studies of the structure and composition of the ocean crust are limited by the several kilometers of intervening water. Several studies have suggested, though, that the Troodos igneous complex on Cyprus is an upthrust fragment of deep-sea floor. If so, its study would yield hitherto unobtainable information.

Six British researchers from the universities of Leicester, Birmingham and East Anglia attempted to find out if the Troodos complex gives the same seismic signature as ocean crust. They report in the Aug. 28 NATURE PHYSICAL SCIENCE that, taking account of the fact that the Troodos crust is free of the great pressures exerted on ocean crust by the weight of water, their results support the view that the Troodos complex is an upthrust piece of oceanic crust.