ENERGY

Conserving half our energy

More than half the energy consumed in the United States is wasted, according to a new study, and efficient conservation practices could enable the country to meet all its new energy needs for the next 25 years. In his report—*Energy: The Case for Conservation*—published by Worldwatch Institute, Denis Hayes concludes, "Energy obtained through conservation is the largest source of new energy currently available to the United States."

Americans, Hayes says, waste more fossil fuel each year than two-thirds of the world consumes. One indication of profligacy is the fact that Sweden, West Germany and Switzerland each have about the same per capita gross national product as the United States, but only about 60 percent as much per capita energy consumption.

The study, funded by the Federal Energy Administration, lists several areas that could show immediate improvement. Abandoning automatic transmissions and switching to radial tires would save a fifth of automobile fuel use, for example, and driving smaller cars could cut fuel needs by nearly one-half. Insulating existing buildings and using more efficient furnaces and air conditioners could save 50 percent on operating energy, while in new buildings with more sophisticated technologies, the savings could be as high as 80 percent. Changes in the way food is grown, processed and packed could save 5 percent of the nation's energy; an additional 4 percent could be recovered from garbage and sewage; and 2 percent could be saved by reducing unnecessary lighting.

Exxon's energy outlook

Interestingly enough, the word "conservation" apparently does not appear in a new report issued by the Exxon Corp., revising their projections of America's energy needs to 1990. A slower growth, however, is expected—2.8 percent annually compared to 4 percent for the 13 years leading up to the Arab oil embargo. Oil, they say, will remain the dominant fuel throughout the period in question, with imports expected to increase to about half the total demand by 1980, where they will level off.

Nuclear energy is expected to be the nation's fastest growing source of energy, supplying 16 percent of total U.S. demand by 1990, compared with 3 percent today. Solar power and breeder reactors should not make significant contributions before 1990. By then, more than half of total natural gas production must "come from reserves yet to be discovered," mostly in Alaska and the Outer Continental Shelf.

But is there gas?

Hopes for finding vast new reserves of natural gas on the Continental Shelf received another setback last week with publication of a National Research Council report, *Gas Reserve Estimation . . . Gulf of Mexico.* Two consultants were hired for the study to examine a sample of 33 producible leases and estimate the gas they would actually produce. With few exceptions, the independent estimates made by the consultants agreed with each other and disagreed with official government estimates by a factor of two or three, implying that figures generated earlier by the Federal Power Commission were seriously inflated.

The explanation given is that the FPC calls "reserves" that gas which could physically be recovered; the NRC consultants restricted their estimates to only that gas which could be reasonably recovered economically. There were also disagreements over interpretation of geological data.

BIOMEDICINE

Vaccine against brain cancer

Although the cause of cancer appears as elusive as ever, investigators are still making progress toward designing a cancer vaccine. In 1974, for example, primates were successfully vaccinated against a cancer for the first time by R. Laufs of the University of Göttingen. He used a vaccine made from a dead herpes virus (SN: 6/29/74, p. 413). Then Werner Schäfer of the Max-Planck Institute, and his American colleagues, succeeded in preventing viral-induced leukemia in mammals using purified viral antigen or viral antiserum (SN: 10/25/75, p. 260).

A biochemist at Boston University School of Medicine, Samuel Bogoch, has purified a viral antigen (protein) from malignant human brain cells and will soon test its value as a brain cancer vaccine.

The antigen, Bogoch explained last week at the annual meeting of the AMERICAN SOCIETY FOR NEUROCHEMISTRY, was produced consistently from malignant brain cancer cells grown in tissue culture fermentation in over 60 generations of cells. He injected the antigen into animals. The animals' bodies produced antibodies in response to the antigen. He then took some of these antibodies and put them in a test tube with malignant brain cells, and the antibodies destroyed the cells. Bogoch will now see whether antigen injection can stimulate animals to make antibodies that will protect them against brain cancer.

Macrophages as tumor assassins

With all the lab tricks biologists have up their sleeves these days, they can get some weird, but provocative results. To wit: Last year several researchers reported that mice infected with the tuberculosis bacterium and injected with the diphtheria bacterium toxin produced a factor in their blood that could kill cancer cells in the test tube. Now Saul Green and his team at the Memorial Sloan-Kettering Cancer Center have confirmed the results. And, as they report in the February PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, they have also partially purified the tumor-killer factor.

It is mostly a sugar-protein, molecular weight about 150,000. Their evidence suggests that either the bacterium or the toxin provokes the mice's macrophages into action. Macrophages are a major class of cells that make up the immune system, the body's defenses against foreign substances. The macrophages then release the tumor-killer factor.

Their research does not answer several nettling questions, though. Is the bacterium or the toxin more critical in provoking macrophages to release the factor? Why would a bacterium or a toxin induce macrophages to make a factor lethal against cancer cells? Finally, why is it that mice infected with the bacterium alone or receiving the toxin alone do not make the factor?

Human chromosomes at high resolution

The ability to visualize dark and light bands on human chromosomes allows geneticists to pinpoint certain chromosomal defects. Now Jorge J. Yunis of the University of Minnesota Medical School reports in the March 26 SCIENCE that he has devised a means of visualizing these bands at higher resolution, particularly during prophase—the first stage of cell division where chromosomes thicken.

Thanks to his technique, he has been able to detect minute chromosomal defects previously unidentified. Example: a patient with moderate mental retardation and with a deletion of light and dark bands on the short arm of chromosome 9.