# ENERGY

## Getting by with low volts

A gadget that cuts the power consumption of household and industrial motors by as much as 65 percent has been developed by Frank J. Nola, an engineer at the National Aeronautics and Space Administration's Marshall Space Flight Center in Alabama. The device, which Nola calls a Power Factor Controller (PFC), continuously senses the power load being carried by a motor. When this load is small, it cuts back the voltage going to the motor to the minimum required. Current flow also drops, greatly reducing the motor's heat loss. Nola estimates that power savings with the PFC are about eight percent when a motor is operating under a heavy load, and increase to as much as 65 percent when a motor is idling.

## Ocean thermal? It's all wet

Not so long ago, extracting heat from the ocean to generate power was billed as a sure-fire energy source for the near future (SN: 6/15/74, p. 381). Supporters claimed that ocean thermal energy would cost less than any other solar-generated electricity, take a small investment compared with nuclear and produce lots of power by about 1985. Not so, says a new study by the U.S. Office of Technology Assessment. According to the report, Ocean Thermal Energy Conversion (OTEC) will probably "not become a viable part of the U.S. energy supply system in this century."

OTEC concepts call for a heat-engine power plant, using warm surface water to vaporize a "working fluid" that drives a huge power-producing turbine. Cold, deep ocean water is then sucked up through large pipes to condense the vapor. The report notes that no scientific breakthroughs are needed to build an OTEC plant. However, none have been built because of technical problems with the cold water pipe, the working fluid and the ocean platform. Problems also stem from the need for a larger-than-expected plant size. A 100 megawatt OTEC plant — about one-tenth the output of many nuclear plants — would need heat exchangers 10 times larger than any now being built.

In the "gee-whiz" stage of OTEC, one Senate aide admitted that much of the work represented "back-of-an-envelope type calculations." The Office of Technology Assessment has gone a bit further. Conventional steam turbines operate with as much as 1,000°F temperature differences. Typically, their efficiency is more than 40 percent. OTEC systems, on the other hand, have temperature differences of 30°F to 40°F and operate at very low efficiencies — from one to four percent. They must, therefore, be mammoth. To produce 100 megawatts, an OTEC plant requires a water flow of approximately 30,000 cubic feet per second — about two and one-half times the flow of the Potomac River past Washington, D.C. And to obtain a 30-to-40-degree temperature difference, the cold water intake pipes must extend 800 meters down into the ocean and be approximately 40 meters in diameter. The report notes that this would be "the equivalent of 20 to 30 Baltimore Harbor Tunnel tubes hanging vertically in the ocean."

## Computing an energy future

Getting a good look at U.S. energy policy for the next few decades calls for a crystal ball of extraordinary clarity. Short of that, the next best thing may be a computer printout showing a simulation of possible U.S. energy policies during the next 35 years. Such a program exists and is available to schools and institutions through a cooperative program between Dartmouth College and Lehigh University. The Fortran-IV program looks at the financing, production and supply-demand of electricity, coal, gas and oil.

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## Hope for gasping lakes

There is hope for lakes dying of eutrophication, excessive algae growth and decay that uses up vital dissolved oxygen. It involves trapping the polluting culprit — excess dissolved phosphorus. In tests on Washington's Medical Lake, researchers at Battelle's Pacific Northwest Laboratories in Richland, Wash., dispersed controlled amounts of alum (aluminum sulfate) from a floating pontoon barge. The alum forms an insoluble floc — a white, cotton-like mass — that chemically binds with soluble phosphorus, according to Battelle's Anthony F. Gasperino. As the floc and trapped phosphorus sink, they blanket the lake floor with a chemical barrier. It prevents additional phosphorus released by decaying algae in the sediment from entering the lake's water. Floccing Medical Lake reduced phosphorus levels 90 percent, Gasperino said, giving the lake a chance to regain its normal cycle. Battelle hopes the treatment will last three to five years.

## DTPA takes the lead

As parents of children with lead poisoning learn, getting lead into the body is a lot easier than getting it out. Removal is necessary, however, to prevent the permanent nerve and brain damage that can occur in cases of severe poisoning. Preliminary animal tests at Argonne National Laboratory, near Chicago, show that DTPA, a potent antidote for radioactive plutonium, is more effective, longer acting and less toxic than any drugs now used for lead poisoning.

As lead enters the body, some rapidly becomes less soluble, forming particles that quickly become trapped within cells of tissues such as the brain, liver and bone. An antidote must reach into the cells, grab the lead, then bind with it to form a soluble complex that can later be flushed out of the body. Such drugs, known as lead chelating agents, have formerly succeeded mainly in removing lead from bone — not necessarily the lead responsible for nerve and brain damage.

Like EDTA, another lead chelating agent, DTPA must be chemically modified to penetrate cell membranes. John Parks engineered Argonne's DTPA modification in hopes of increasing its effectiveness at removing plutonium from mouse liver cells. While it wasn't any better at plutonium, Argonne's Arthur Lindenbaum and colleagues showed that following an injection of the modified DTPA, "a small fraction is rapidly deposited in and retained by brain and nerve tissues," according to the May ARGONNE NEWS.

Tests showed it removed significant amounts of lead from the brain, "but whether DTPA also will reduce or reverse brain damage in mice, and then in man, remains to be seen," Lindenbaum says. Further tests are necessary before it can be used on humans, but Lindenbaum hopes that if it works there for lead, it may also prove effective against other toxic heavy metals such as antimony, arsenic, cadmium and nickel.

## Pollution increases pesticide danger

Dust and high levels of ozone (an air pollutant) increase production of paroxon from the widely used organophosphate pesticide parathion 30-fold over cleaner settings, according to Robert Spear, Yun-San Lee, John Leffingwell and David Jenkins of the University of California at Berkeley in the March-April JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY. Paroxon, formed by the addition of oxygen to parathion, is 10 to 100 times more toxic than parathion and appears to have caused at least 29 poisonings in California field-workers, Leffingwell says. Other organophosphate pesticides may react in a similar way, he cautions.