RESOURCES & ENVIRONMENT

Electricity from Salt Water?

"On Solar Ponds: Salty Fare for the World's Energy Appetite" by Michael Edesess, in *Technology Review* (Nov.-Dec. 1982), Room 10-140, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

In 1902, the Russian scientist A. von Kaleczinsky was surprised to find subsurface temperatures of over 185°F in Lake Medve, Transylvania (now part of Rumania). Today, researchers are capitalizing on his discovery to provide low-cost energy and heat in remote areas.

Salt water is the key to Lake Medve's warmth: Such "solar ponds" contain layers of water with different concentrations of salt, with saltier, heavier water nearer the bottom. The ponds are shallow, allowing the sun to warm the bottom layers, but the water there is too heavy to rise to the surface and cool. Solar heat is thus trapped and stored.

According to Edesess, an executive at Flow Industries, Inc., Israeli scientists built the first experimental solar pond in 1960. To extract heat for warming buildings, hot brine is simply passed through heat exchangers; to generate electricity, the brine is used to evaporate a liquid with a low boiling point and the steam drives a turbine. In 1979, the Israelis constructed a pond the size of five football fields—7,000 square meters—at Ein Bokek, near the Dead Sea. Its peak output is 150 kilowatts, enough electricity to power a large office building. By the turn of the century, the Israelis plan to build a huge complex in the Dead Sea, itself a big salt water pond, that would nearly double the nation's present *total* electricity output.

Today, however, generating electricity from solar ponds is practical chiefly in isolated communities requiring little power—Australia's Outback, remote tropical islands. The ponds can capture up to 20 percent of the solar energy striking their surface—half as efficient as conventional solar flat-plate collectors, but one-tenth as costly to build. But there are problems. Natural salt water ponds are rare; artificial ponds have high price tags. High maintenance costs, large space requirements for artificial ponds, and heat loss through the pond bottoms are also troublesome.

But salt water ponds could economically supply direct heating. A 2,000-square-meter pond, for example, heats the municipal swimming pool in Miamisburg, Ohio. Greenhouses, barns, and homes in the U.S. southwest are other candidates for such systems.

Research on solar pond technology was sporadic before 1974 when the cost of competing energy sources was low, Edesess notes. Although scientists in the United States, India, Israel, and Turkey have since started new demonstration projects, it will take another big jump in oil and gas prices to make solar ponds financially feasible.