

ENERGY

Solar power, now or never

A national transition to greatly increased use of solar power, "the only sensible means of solving the energy crisis, cannot be achieved simply by inventing cost-effective solar technologies and arbitrarily introducing them into the existing energy system," said Barry Commoner, director of the Center for the Biology of Natural Systems, at a solar-energy symposium in Washington, Dec. 15. "What is needed," he said, "is the step-by-step introduction of both new solar-energy-producing and new energy-using technologies, systematically organized to harmonize with each other and with existing conventional technologies that are to gradually be replaced."

Commoner told the collection of small solar-energy firms, economists, and antitrust lawyers that solar-energy critics have "with considerable justification" said that even if solar collectors are cost- and performance-competitive with conventional space-heating technologies, "a transformation of the entire production system cannot be carried out unless solar-generated electricity can be applied to tasks that require energy in that form."

Studies by the former Federal Energy Administration removed that barrier with evidence that a transition to a commercially feasible solar industry could be established through federal support of a systematic, integrated program, Commoner said. Conventional wisdom said solar devices "were obviously uneconomical because they would be inadequate during . . . cloudy spells." But use of solar collectors with conventional backup heating (for cloudy days or nighttime generation) would permit solar collectors in most parts of the country to cut expected conventional-fuel use "by half, at a substantial saving when compared with the cost of electric heat," Commoner said.

In some cases solar power is already competitive. For example, Commoner said conversion of manure to methane at 200-head dairy farms already competes with waste-disposal costs. And a \$98 million federal-purchase program approved by the Congress's energy conference committee "is expected to buy photovoltaic cells at a price that by 1983 will make it cheaper to use them, rather than utility power, for street and highway lights," he said. Finally, the bids "have just come in" for a 250-kilovolt photovoltaic-powered school in Arkansas at a price of \$3 per watt for the cells — a two-thirds drop in price over the going rate, he said.

Commoner stressed that a national commitment to solar power "must be made now in order to take the necessary steps in time and to prevent other actions—such as the National Energy Plan's intensification of centralized-power production—which would foreclose introducing solar technologies later on."

Storing heat with Glauber's salt

The adequacy of a solar-heating system depends largely on the availability of good heat storage to tide users over when the sun doesn't shine or when particularly cold days draw heavily on the heating system. General Electric Co. has developed a thermal storage system using Glauber's salt (sodium sulfate decahydrate) as its storage medium. GE says it stores seven times as much energy as an equal volume of water, 12 times as much as an equal volume of rock. (Both water and rock are frequently used heat-storage media.) Previous attempts at harnessing Glauber's salt for thermal storage were plagued by its complete solidification after 10 heating-cooling cycles (involving melting and solidification of the salt), and crusting along container walls which reduced heat-transfer efficiency. GE has solved both problems by slowly rotating the salt in a bin. In the next 30 months GE plans to build and test a 200-gallon (one-quarter scale) model, partially sponsored by the Department of Energy.

SPACE SCIENCES

Europe joins 24-hour weather satellite net

The European Space Agency's Meteosat, latest entry in a global network of geosynchronous, 24-hour-a-day weather satellites, is now aloft, in position and undergoing test operations. Launched on November 23, 1976, it reached its assigned longitude of 0° (over the Gulf of Guinea) on Dec. 7. The first visible-light image from its high-resolution radiometer was received at the Darmstadt, Germany, control center on Dec. 9, followed by the first infrared image on Dec. 11.

The probe is scheduled to become operational in May, and ground stations are already capable of receiving its images in France, South Africa, Germany, the United Kingdom, Switzerland, Greece, Malawi and Senegal. The ESA entry joins several satellites from the United States along with Japan's GMS in the Geostationary Operational Environmental Satellite Network, leaving hoped-for Soviet satellites to complete the circle. (Another U.S. GOES satellite is scheduled for launch in May.)

Expanding talksat capacity

Early in 1976, a committee of the National Research Council's Space Applications Board urged that NASA resume its former involvement with research and development in satellite communications, pursuing technical advances in response to various user needs (SN: 4/9/77, p. 231). Suggested development areas included higher frequencies, more sharply focused signal beams and sophisticated on-board switching to direct the beams to specific ground receivers. Now a group of Bell Labs researchers has proposed a concept, essentially combining all three of those technologies, that they say could more than double the present capacity of communications satellites.

The "scanning/spot-beam" approach calls for a narrow microwave beam that would rapidly sweep the entire United States much as an electron beam scans a television screen. The beam's "footprint" would cover about 1 percent of the country's area, sweeping the contiguous 48 states in 0.01 second. In that time, individual ground stations would send and receive their own communications in allotted time slots, with each message coded to its station's unique "address."

This localizing capability would allow greater reuse of the individual frequencies within the satellite's operating bandwidth, which the researchers believe could increase the capacity of a single satellite channel from 15,000 telephone conversations to more than 50,000. In addition, antennas as small as 3 meters in diameter could be used, enabling them to be placed atop buildings. According to D. O. Reudink and Y. S. Yeh of Bell Labs, in-city antenna locations could be made more practical (New York City's is now in Hawley, Pa.) by raising the satellite band from the commonly used 4-6 gigahertz to the 11-14 GHz range, thus reducing interference with the frequencies used in land-based microwave relaying of long-distance telephone calls.

Reudink and Yeh claim that the proposed system (for which prototype test hardware is now being developed) could reduce the cost of "multipoint video teleconferencing," as well as of various types of tie-lines and private networks, and lead to more widespread use of highspeed data transmission.

IUS engine passes milestone

The large, solid-propellant rocket motor of the Interim Upper Stage (IUS) booster, being developed by the U.S. Air Force to carry space shuttle payloads to higher orbits or interplanetary trajectories, passed a major milestone on Dec. 19 when it was successfully test-fired for 157 seconds. The long-burning booster's first task will be to transfer a Tracking and Data-Relay Satellite to geosynchronous altitude in 1980.