**OPTIMISM FOR DAM-ATOLL**

Thomas P. Higgins says early research and development results "provide optimism for cost competitiveness" for Dam-Atoll, the system to convert ocean-wave energy into electricity. Higgins is manager of Ocean Energy Systems at the Lockheed Missiles and Space Company, Sunnyvale, California. He and Clinton P. Sherburne, manager of the Dam-Atoll program, co-authored a paper which Higgins presented at the Sixth Marine Systems Conference of the American Institute of Aeronautics and Astronautics.

The authors estimated the capital installed cost of an early-production Dam-Atoll unit at $8 million to $12 million. Higgins said that as the cost of fossil fuel soars "it appears quite probable that a group of Dam-Atoll units can provide competitive energy in the latter part of this decade". Earlier, Higgins told scientists meeting in Madras, India that Dam-Atoll could be competitive in Third World locations with adequate wave-energy resources.

In June 1981 Sherburne told the Eighth Annual Ocean Energy Conference in Washington DC that the cost of electricity from Dam-Atoll could be as low as 7.5 cents per kilowatt-hour, "the same as oil-steam today". While Dam-Atoll production costs would rise only slightly, he said, fossil fuels are expected to continue increasing significantly in price.

Dam-Atoll would consist of a concrete dome 300 feet (100 meters) in diameter, its top just breaking the ocean surface. At its center, curved vanes would guide incoming waves after they refract (bend) around the atoll shape of the dome. The vanes would direct the water into a central core 60 feet (20 meters) in diameter so as to create a vortex inside the core, causing hundreds of tons of seawater to swirl downward to turn a turbine. The turbine would drive a generator producing 1 to 2 megawatts of electricity, enough to serve about 500 homes.

A newly-designed dome, shallower and flatter than previous designs, would act as a "surf ramp" to achieve maximum wave-capture efficiency, giving Dam-Atoll an overall efficiency up to 45%. Previous designs envisioned a floating, moored Dam-Atoll which would follow tidal changes. Lockheed's research now indicates that the unit's performance could be improved even further by providing the capability to adjust ("tune") for wave height, maximizing power output. This ability to adjust the depth could also be used to "duck" beneath the surface during severe storms.

Dam-Atoll would operate best off the western side of land masses such as the Pacific Coast of North America, the Arabian Sea off Pakistan and India, or the North Atlantic coast of Scotland. It could supply electrical loads tailored to local needs by selecting the proper number of units required.

Lockheed studies indicate that fabrication of the large dome and subsequent assembly of the system should be done relatively close to the installation site, enhancing the use of skills and labor. "These factors offer great potential for isolated or less-developed areas which need electrical power," Higgins said.

The Dam-Atoll program is in the early research and development stages. Lockheed is doing analyses and studies to provide the basis for design and testing of models, and is under contract to the US Department of Energy/Solar Energy Research Institute to be done.

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**WHAT IS DAM-ATOLL?**

Dam-Atoll is a revolutionary device for conversion of wave energy into useful energy. The dome-shaped structure can be permanently mounted on the seafloor or anchored on site, depending on seafloor conditions. The name Dam-Atoll, a trademark of the Lockheed Missiles and Space Company, is derived from the fact that the plant has the characteristics of both a dam and an atoll. The Dam-Atoll can be used as electricity producer, oil-spill skimmer, or breakwater.

Electricity is produced in the Dam-Atoll by a simple hydraulic turbine rotating under a gravity-induced pressure head. Waves arriving with a frequency of seven to ten seconds are refracted by the shape of the structure. Thus as they approach the center of the dome they enter the water-guide vanes in progressive order. The guide vanes are curved so that the water entering them is caused to spiral downward in the central core. The spiraling, falling water rotates a turbine/generator set, and water is discharged through the base of the structure. An 80-meter-diameter Dam-Atoll could produce one to one-and-a-half megawatts, enough to meet the needs of nearly 500 homes.

By extracting energy from the waves, wave energy is reduced, leaving calm water in the wake of the structure. This fact makes Dam-Atoll a useful mechanism for shoreline protection and for the creation of artificial harbors offshore.

Oil sticks on the water surface from accidental spills or natural seepage could be removed by using Dam-Atoll. As the oil-contaminated surface water enters the plant, the oil could be separated and recovered.

The adjacent photo and others in this issue show the design of this innovative wave-energy-conversion device. Further development of this concept is under way at Lockheed.
LOCKHEED REORGANIZES OCEAN SCIENCE LABORATORY

A prominent American ocean scientist, Dr. Andreas B. Rechnitzer, has been named manager of a reorganized Lockheed Ocean Science Laboratory (LOSL), headquartered in Carlsbad, California. The new organization combines Lockheed Environmental Sciences, also located in Carlsbad, and the ocean-science group previously at Lockheed Ocean Laboratory in San Diego.

"Combining Lockheed’s ocean-science activities will result in one group with the fully-developed capability to handle almost any job," said James Wenzel, Lockheed Missiles and Space Company vice-president for Ocean Systems. "We are very fortunate to have a scientist of Dr. Rechnitzer’s standing join us as we enhance our ocean-science capabilities."

Rechnitzer will be in charge of a team of more than 50 ocean scientists, engineers, and technicians who conduct marine surveys, study local marine biology for coastal power plants, perform bioassays, and conduct research on ocean mining.

Currently, Rechnitzer is assistant for the International and Interagency Affairs Office of the Chief of Naval Operations in Washington DC. He is the author of numerous articles and technical papers, and was co-author of the first book of rules and methods for scuba diving in the US, published in 1950. Rechnitzer became the first American civilian pilot of the US Navy’s Trieste bathyscaphe in 1959, and has participated in numerous underwater explorations and studies. During his long career, he was also scientist-in-charge of the Trieste in 1960 when it dived to 35,800 feet in the Marianas Trench — believed to be the world’s deepest dive.

In announcing the appointment and the reorganization of LOSL, Wenzel also said that the Corrosion Protection Systems personnel, previously part of Lockheed Environmental Sciences, have been transferred to Lockheed Offshore Systems and Services at the Company’s Ocean Systems Organization in Sunnyvale. However Wenzel said ocean mining, a tow tank for hydrodynamic testing, and the Lockheed submersible Deep Quest will continue to operate at Lockheed-San Diego’s Harbor Island facilities.

A current example of Lockheed Environmental Sciences work is a $1.3 million bioassay of Pyramid Lake, Nevada to determine the effect of dissolved solids on the marine environment. This investigation is being performed under a 27-month contract from the US Bureau of Indian Affairs. Previously, Environmental Sciences performed marine environmental studies at the San Onofre and Diablo Canyon (California) nuclear power plants.

Corrosion Protection Services provides a patented cathodic protection system to guard underwater marine structures such as pipelines, petroleum-production platforms, and transportation tubes against galvanic corrosion.

(continued from Page 1)
SUBSCRIBER POLL SHOWS MOST PREFER CURRENT FORMAT

In mid-June OE mailed a questionnaire to all subscribers, the first since this publication’s inception in 1977, stressing that OE wants to provide its subscribers with what you want. The results showed that a majority of readers were happy with OE as is. However several areas of interest will receive greater emphasis: international news, Congressional activities, and technical reports. Those areas which will receive slightly less emphasis are regulations and licensing procedures, legal issues, and patents. However the latter areas will become more important in the near future as OTEC leaves the research-and-development phase and begins to move into commercialization.

Nearly 80 subscribers took the time to respond. A breakdown of their preferences appears in the adjoining table.

WE WOULD PREFER IN FUTURE ISSUES OF OCEAN ENERGY:

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INTERNATIONAL NEWS
CONGRESSIONAL ACTIVITIES
TECHNICAL REPORTS
CONTRACT AWARDS & PROCUREMENT OPPORTUNITIES
INTERVIEWS (GOVERNMENT AND/OR INDUSTRY)
REGULATIONS & LICENSING PROCEDURES
PHOTOS, DIGRAMS, GRAPHS, ETC.
MORE FREQUENT CALENDARS OF MEETINGS, ETC.
DATA SOURCES
LEGAL ISSUES AND PATENTS

PUBLICATIONS AVAILABLE


Both of the above are available from Pergamon Press, Fairview Park, Elmsford, New York 10523.

US GOVERNMENT PROCUREMENT INVITATIONS AND CONTRACT AWARDS

Listed below are procurement invitations and contract awards related to OTEC in particular and ocean resources in general culled from the Commerce Business Daily. This is not to be construed, however, as a complete list.


Jul 2: Parametric Performance Studies of Fluidized Bed Heat Exchanger: Negotiations are being conducted on a sole-source basis with the United Technologies Research Center of East Hartford, Connecticut for the above-named project. US Department of Energy, Pittsburgh Energy Technology Center, PO Box 10940, Pittsburgh, Pennsylvania 15236.

(continued on Page 4)

The table above is a comparison of OTEC equipment specifications for a 100-kilowatt test plant and a 2500-kilowatt commercial plant, reproduced from a brochure published by the Tokyo Electric Power Services Company (TEPSCO).

Solar OCEAN ENERGY Liaison Chicago 60605 August 1981

Jul 8: South Atlantic Outer Continental Shelf Physical Oceanography Year 4 Program: Contract AA-851-CT-1-25, for an estimated cost plus fixed fee of $525,829, has been awarded to Science Applications Incorporated, 1200 Prospect Street, La Jolla, California 92038. US Department of the Interior, Bureau of Land Management, 38th and C Streets Northwest, Washington DC 20240.

Jul 13: Analyze Issues and Problems Associated with the Integration of New Energy Technologies: Responses will be inviting proposals to prepare critical-issue survey papers addressing important issues and problems associated with integrating new energy technologies into the nation's electrical systems. These issues cover the range of electric-utility-system planning, system operations, and institutional concerns associated with the introduction of energy technologies whose spatial and temporal characteristics are fundamentally different from those of today's technologies and which will alter the planning of electric generation, transmission, and distribution systems of the future. The information developed in these papers will be used in the planning of a major research and development program focused on the successful accomplishment of technology integration. It is anticipated that awards will be in the range of one to two person months and require four months for technical performance. As many as 20 fixed-price contracts are anticipated. Union Carbide Corporation, Nuclear Division, Attention A. F. Johnson, PO Box M, Oak Ridge, Tennessee 37830, (615) 576-1406.

Jul 14: Development of an Air-Deployed Oceanographic Mooring (ADOM) Compatible Hydrophone/Cable Assembly for Gathering Acoustic Data: Negotiations are being conducted with EG&G Washington Analytical Services Incorporated, 2150 Fields Road, Rockville, Maryland 20850. Office of Naval Research, 800 North Quincy Street, Arlington, Virginia 22217.


Jul 15: Investigation into Zirconium, Titanium, and Their Alloys with Molybdenum Pressurized to 100 Kilobars at Room Temperature to Study the Omega Phase Transition: Metastable Omega Phase crystal structure will be studied by transition electron microscopy. Communications will be conducted only with Man Labs Incorporated, since it is a continuation of work previously performed by a principal investigator, DAAA22-81-R-0124. Purchasing and Contracting Division, Watervliet Arsenal, Watervliet, New York 12189, (518) 266-5147.


Jul 20: Research Entitled "Flux of Energy and Essential Elements Through the Pelagic Portion of the Continental Shelf Ecosystem": Modification to existing contract DE-AS-09-76-EV-00639, for $97,455, awarded June 25th, 1981 to the University of Georgia Research Foundation Incorporated, Savannah River Operations Office, PO Box A, Aiken, South Carolina 29801.


Jul 29: Data Collection, Exercise Analysis and Reconstruction, and Report Preparation for Two Sea Venture Exercises: Negotiations are being conducted with TRW, 7600 Colshire Drive, McLean, Virginia 22102. Office of Naval Research, 800 North Quincy Street, Arlington, Virginia 22217.


Jul 30: Ocean Environmental Studies Consisting of Analysis (1) of Data from Aerial Surveys, (2) of Sounds of Marine Mammals, (3) of Anti fouling Coatings and Related Materials, and (4) Evaluation of a New Biochemical Indicator System: Negotiations are being conducted with Computer Sciences Corporation, 4045 Hancock Street, San Diego, California 92110, for RFP N68001-81-D-0529. Commander, Naval Ocean Systems Center, San Diego, California 92152, Attention W. P. Walton, Code 4222, (714) 225-2334.

Jul 31: Development of an Erosion-Resistant, Anti-Fouling Metallized Propeller Coating Applied With Thermal Spray Techniques: In accordance with the specifications, RFP N00024-81-R-5365 will be issued to Flame Spray Incorporated, 4674 Alvarado Canyon Road, San Diego, California 92120. Commander, Naval Sea System Command, Washington DC 20362.


Aug 6: Determine the Effects of Surface Residual Stresses on the Growth of Microcracks in Titanium Weldments: Negotiations are to be conducted with South-west Research Institute, 8500 Culebra Road, PO Box 28510, San Antonio, Texas 78284. Office of Naval Research, 800 North Quincy Street, Arlington, Virginia 22217.