N E W S

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THE FIRST EDITION

This occasional email attachment contains information about Ocean Wave Energy Company, renewable electrical generation technologies, water purification/hydrogen cycling, and climate management of the air-ocean world. OWECO Outsights focus upon related environmental issues and opinions.

Thank you for your interest and, who long ago placed newsletter requests, patience despite OWECO web site form absence. OWECO formerly posted news to the site, and many of us receive far too much email, but this method permits more timely interactivity. Initial editions acclimate readers with some OWECO hestory (gender-neutral word replacing his (s)tory) leading to current and future work. It is hoped the rather amateur format will be excused and suggestions for improvements are welcome, particularly, on methods for reducing file size. For now, OWECO News is in PDF form but can be provided as a larger MS Word document upon request. This very small company also needs voluntary or low cost assistance of those with graphic design or web development skills.

1. WAKE TO WAVES Part 1

Hydrocarbon hunger is ever more compromising pristine places and species. Rather than appreciating the gift of nature's less humanly disturbed regions, addiction now leads toward extraction of 90 billion barrels, within the Arctic Circle, for supplying three more years world oil demand and new definition for the term "black ice". Such behavior is countermanded by increasing sound of an international carbon-use wake up call, predominantly, as effecting atmospheric and hydrospheric thermo-chemical interactions. OWEC Ocean Wave Energy Converter® inventor and OWECO founder, Foerd Ames, participates as report technical reviewer for IPCC Intergovernmental Panel on Climate Change and is pleased with some recent consensus shifts- moving from definition of anthropogenic or natural attributions to include quantification of both contributors, binding climate with hydrocarbon combustion, and solution scenarios. Yet, in a setting of international disparity, bizarre headlines such as July 2008 First Enercast Financial- "Global warming and record prices put Arctic oil within reach" and "Oil Tumbles More Than $6 as Slowing Economy Threatens Demand", twist perceptions of the required transition to renewable energies. Conversely, USA elected officials' cries to "free our oil" and "drill, drill, drill" (from strategic domestic reserves) stress current pricing difficulty on hard-working Americans. But this continuation of plunder-as-usual totally omits true value of un-combusted hydrocarbons, environmental cost, and recognition of the transition in which we are. Oil is still undervalued. Dialogue evolution also provides false re-entry points for nuclear energy and oxymoronic "clean coal" sales calls. Relegating hidden waste sequestration processing cost, to future generations, neither accommodates water cycling- particularly, deposition of formerly land-locked ice as melted fresh water into salty seas and effects on thermohaline circulation.

Although seldom found in the same sentence with solar and wind conversion, renewable ocean energy technology is gaining recognition as important solution. Since 1978, OWECO promotes its large-scale implementation for electrolytic hydrogen gas production and attendant sea level

control. Like canaries in coalmines, smaller coastal and island regions are tolerating immediate brunt, in some cases, dealing with raised levels, increased storm surge, and coastal erosion. Already bearing higher cost of imported conventional energy, there, debate has little meaning. Will appropriate in/action occur "just-in-time" or is practical remediation passed? In their favor, some of these countries see possibility for new technology dual application, as both power supply and breakwater, and are more nimbly beginning the necessary work toward energy use sea change. Their results may provide a "litmus test" for larger, more entrenched nations to follow - a seemingly reverse approach with respect to prior capitalization practice and new technology take-up models. Toward such activity, Foerd spoke in Martinique and Sicily and participated in a Norway conference. OWECO explored use of its OWEC Ocean Wave Energy Converter® for dual use as protection about Hawaii's new Coral Reef Ecosystem Reserve. Although OWECO presented at three of five Energy Ocean conferences, unfortunately, Foerd was unable to attend last year's Oahu meeting or this year's Galveston conference. Reflecting increasing number of companies, instead of speaking, there seems a polarity shift in which most wave energy developers listen to financiers and regulatory personnel.

Growing economies of China and India currently exhibit guarded environmental consideration. While the latest Indian nuclear technology deal with USA is bad news, hopefully, the jury is still out on their energy direction. Having participated in last year's USIBA US India Business Alliance energy seminar in Washington, DC, being keynote speaker about wave energy at the COGEN

Foerd lighting ceremonial candles in Nagpur, India February, 2008

All India Seminar on Non-conventional Energy Sources 2008, Nagpur, and then meeting with the head of India Power Finance Corporation (a government undertaking), New Delhi, Foerd concluded mixed messages are occurrent just as they are generally on a worldwide basis. India does have a Minister of New and Renewable Energy, in attendance at COGEN, and healthy internal dialogue is very evident, although other forces seem much stronger. Their top floor view was clearer than from a last Delhi visit of a decade ago. It was largely due to use of natural gas propelled auto rickshaws. On the other hand, mouth-kerchiefed motor scooterists still weave and bob to the front of red lighted traffic and the usual plumes emanate upon the green as they again fall to back of the line. The conference featured presentations geared toward "energy to common man", including modified bicycle electrical generators, chaff cutters, and other decentralized energy conversion tools- long considered but little used. Is it lip service? As industry delegate at the inspiring 2008 WIREC Washington International Renewable Energy Conference, Foerd heard India's pledge to add at least 48 MW of renewable energy over the next five years- drops in the bucket. Coal India Limited is pushing ahead with its exclusive use, in new power plants, without consideration for problematic sequestration. The name really must be reversed to Limited India Coal and accordant steps taken for implementing substantial renewable resources among which are solar, wind, and wave (near South and West regions). With latest Indian bomb blasts and Pakistan PM Gilani's arms request, "nuclear renaissance" aspirations still dubiously tie to long lasting neighborly animosity- some of whose entities OWECO has discussions. Foerd was also invited to present OWEC® at the 2008 New Energy Show, Beijing, but could not attend. China is

making good stride with wind power, annually doubling output since 2005, and is predicted to reach parity with coal use by 2015. Would not complete cessation of coal processing, now, hasten such aspiration? Regardless of festered protectionist politics of the blame game, since one-third China's production is exported west, musical chair sitting must be avoided to holistically cooperate with lasting energy implementation scenarios. Timely epoch is still conceivable when all 6.7 billion realize mutual responsibility for our shared air-land-water world with other species: "Dare to be naïve", quoting Dr. R. Buckminster Fuller (dec.) paraphrase of our secondary school credo, "Dare to be true".

2. STARTS AND FITS Part 1

Ocean Wave Energy Company, one of the longest continually operating developers with the first industry web site, continues as a very small entity. With exception of corporate or government effort, such as Lockheed Dam-Atoll and the Japanese "Kaimei" barge oscillating water column experiments, just a handful of individual and university developers existed in the 1970's. Group patent art was minimal. Remarkable exception is attributed to I.L. Roberts who, near time of early electrification in 1881, received patent of modular, buoy-based, linear-to-rotary converters for mechanically utilizing wave power. Although the system was to be shore-installed, present world natural status would be healthier if then was developed ocean energy derived hydrogen fuel for useful purpose. During the renewables chilling 1980's, at dinner parties, mother would tell son that nobody wants to hear about wave energy. OWEC® working models appeared "oddball" at numerous energy expositions devoted to homeowners.

Following 1978 inception, 1980 patent, productive 1982 wave tank tests of nine LEG linear electric generators, and extensive outreach efforts, Foerd retrenched to the drawing board, replacing the LEG with more standardized linear-rotary transmission, commercial generator having flywheel, a new buoy design, and prosecuted 1987 patent. 1989 US DOT Coast Guard Small Business Innovation Research contract enabled small-scale converter test analysis. During the following promising administration, surprisingly, renewables generally suffered funding cutback. Thanks to France's engineering school requirements and local talent, OWEC® development presses on as, one-by-one, savvy young interns take the hot seat to feed a growing technical database. Studies are underway or complete for buoy, buoy shafts, buoyancy chamber, damper sheet, connectors, and overall module hydrodynamics. Truss analysis used individual module stress/strain data for exploring relations between interconnected modules of different array patterns and various mooring configuration loads. Under development are refined software algorithms for correlating above factors with generator and ballast control when deployed in complex seas.

Important data was recently returned after OWECO endured a partnership take-over attempt. In terms of precious time, a growing problem is ramping funding going to schemes that are duplicative, or permutational, of legacy technology and implemented in taut moored or fixed foundation, non-modular, multiple-single-point-of-use designs. Actively ignoring freely available information, weak performance or failure is staining the growing wave energy industry. Part 2 will explore the issue in further detail.

3. OWEC® 3 PATENT

OWECO's third patent issued April 2008 after an extended pendency. Even with apparent growth of other "hydraulic and pneumatic routing or concentration before power take-off" schemes, the third major OWEC® technology iteration maintains its direct-drive electrical generation approach. A symbiosis of our previous designs, two main components of a double cage type generator integrate flywheel effect in both reciprocation directions. Heavier components activate from buoyant upstroke and lighter elements counter-rotate from downstroke buoy/driveshaft gravity force. The arrangement raises relative speed and power efficiency with fewer parts. As shown in the OWECO web site animation (with sound), an objective for optimal energy extraction is to maintain buoys near full submergence through all stages of passing waves. Power variation range is relatively narrow for each buoy size and

matched energy conversion means. Promising engineering models incorporate embedded conditioning systems to adjust power take-off in relation to waves, buoy attitude, and adaptable module ballast. Integrated sensors of multi-modular OWEB Ocean Wave Energy Webs permit real-time complex wave mapping for efficiently preconditioning individual power take-off means just-in-advance of local impinging waves. In addition to hydrodynamic and mechanical considerations, it is desirable to optimize process and quick assembly methods. OWEC® modules are systematically produced and flexibly deployed in high volume. Close-pack nesting parts include large buoy and air chamber, chassis, and tubes. Another example is bayonet mount driveshaft racks using slip-fit connections. Space-saving components accommodate greater unit quantity per operation in factory, overland transport, or waterborne vessels. Module base connectors are made of space-saving nesting tubes that form strong corners when assembled. Lock pins provide two or three way quick connections with other module bases. Mating tolerances allow adjustment of overall truss flexibility and force dispersion. Connectors are supplied with redundant security features and shock absorbers to dampen impact loads from downward shaft and buoy movement. Overtopping waves on buoys induce maximum downward forces but they are relatively low. Though shown as springs, a variety of resilient absorber materials may be implemented including entrapped seawater. Images are available here and further description will be included in the next OWECO News. Please feel free to contact Foerd for more details.

4. OWECO SHOP

Ocean Wave Energy Company recently purchased a workshop in Portsmouth, Rhode Island. For many years, the Company rented a 2,000 sq. ft. loft below its Bristol harbor-front office. The new 1,750 sq. ft. OWECO Shop is practical, ground floor with clerestory ceiling, and reasonably near highway and water shipping routes on Aquidneck Island. Its floor plan provides sufficient bench top, for component fabrication, and open area for smallest full-scale module or large parts construction. A substantial steel gantry and hoist was constructed spanning back to front and terminates at overhead door to outside. The arrangement provides for experimental wave simulation test bed, sequential manufacturing, and partial or full module final assembly. As OWEC® modules are scaled to larger size, the Shop will accommodate construction of "factory sealed and guaranteed" buoyancy chambers. Chambers, buoys, and remaining module portions can be close-pack stacked, in quantity, and assembled outdoors or at site. The shop's second floor has a conference area, office/drafting room, and comfort amenities. We are still in transition to locating major operations at the new facility.

OUTSIGHTS

FOERD AMES HESTORY Part 1

If generally healthy, each of us is gifted with amazing equipment for assimilation and response with our surroundings. Please indulge the following content related to Foerd's first empirical thinking toward a case for systematic ocean wave energy conversion. The OWECO web site About Us section describes some background leading to invention of OWEC Ocean Wave Energy Converter® during March 1978. But, really, the mission started in the 1960's while growing up at Cold Spring Harbor, Long Island, New York. It was a good life abounding with water

related activities as swimming, standing on submerged horizontal kickboards until external forces affected such status and observing their vertically turning ascent to hydroface, mucking about in tiny watercraft and making ripples on still water, skiing along chop and calm waters, sailing in Blue Jay (relatively narrow and cutting), Woodpussy (beamy with little draft), and small power boating (skimming and wave riding to save petroleum). Meaningful familiarity was absorbed when huddled below deck, way forward in the bow of an Atlantic sailboat, isolated from a grandfather's frantic racing crew. There, like a carnival ride, power of water waves was assimilated in the bones. Years later, while living in Hawaii, turbulent effects of immense shore-breaking waves imbibed lasting impressions as they slammed this thrilled bodysurfer into the sand. Swimming offshore, these tremendous monsters could serenely pass overhead by diving to some depth of decreased orbital motions. Foerd still patches a fat little 1968 Beetlecat gaff rig classic for every sailing season, about the same size as one half a smallest scale, sideway OWEC® buoy, and has always been a canoeist. Counter to such idyllic experience, on the brief train or auto ride to New York City, natures' colorful spectrum transformed from vivid carbon sunsets to shades of gray and brown. A mother's formality required dark suits be worn but there was refusal to don business hat. Now comprehended, the days' natty style functioned to mask city folk from local industrial air-born pollutants. Daily smog alerts were issued in addition to radio reports of traffic conditions and heroin deaths. America's economic brain trust locus, and conceivably that of the world, is still concentrated on Manhattan Island. The City has since transformed to relative cleanliness as manufacturing dispersed to outlying regions and other countries. Direct experience disconnect, of the hands at the wheel with more distant workings of today's pollution machines, is lately becoming roused to ocean renewable energy profit potential. The recent NYC Global Marine Renewable Energy Conference convened healthy ratio of government personnel, financing representatives, and wave/tidal developers. This phase can be excruciating, often involving imprudent pair-ups, chomped bit false starts, and is made more complex by evolving regulatory measures and dis/incentive strategies. However, evidence is mounting of quickening pace for practical transition to a water-based renewable hydrogen economy. One looming climate predicament is changing sea levels and salinity gradients due to large scale ice sheet calving and accelerated melting processes. Symptoms are manifesting in ocean water volume thermal expansion, mixing of fresh water formerly bound in land-situated ice, and resulting sea level rise. As stated, hydrocarbon and nuclear processed hydrogen production will not attend to such aqueous aspects of climate participation and must be destined to the back burner as "alternative energy". The perceived "problem" may actually be most elegantly resolved if seawater is considered as fuel source and fresh water supply. When adequate proportion is converted to hydrogen and oxygen gases, sequestered in power processes of human industry, and recycled, then the problem is synergetic solution.

New York City, 1960's