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Statement regarding the WavePiston wave energy converter (WEC) technology

Among the numerous emerging and near-commercialized technologies for extracting energy from waves, the WavePiston is both promising in its general approach to wave-energy extraction and favorably unique in several important respects.

In general, its extraction of surge energy is preferable compared to other devices that capture heave energy. The reasons are multifold but are largely due to the large buoyant volume needed to capture the vertical motions associated with heave and the difficulty in tuning such a device to waves of varying period. By comparison, capturing horizontal surge motion is done by resisting the horizontal component of the water's velocity and is purely a drag phenomenon. This is important, because these forces can be captured with lightweight structures absent the mass and associated cost of large buoyant volumes.

There are a number of WEC designs that capture surge energy but most are positioned on the seabed and therefore have a limited range of installation depths. They also experience varying wave energy flux between periods of high and low tide. Also, many of these devices are configured as pivoting plates, meaning that their motions are not well matched to the particle displacement profile associated with a passing wave.

By being positioned close to the sea surface, WavePiston is poised to capture the most energetic portions of each wave. It is also important to note that the surge forces imposed on one paddle are counteracted by forces imposed on its neighbors rather than some fixed point on the seabed. As a result, the sum of the forces from all plates along a string of plates is typically small since some plates are being driven shoreward while others are driven seaward. This is an important and unique distinction because it means that while the internal forces may be powerful, the mooring system needed to keep the device in place is quite modest. This feature of internal "force cancellation" is significant and in my view sets the concept apart from competing technologies with respect to its likely costs of fabrication and installation.

For WECs, the key to successful commercialization is the right combination of low cost, good conversion efficiency, and survivability. WavePiston, because of its unique design is poised to offer a breakthrough in all three categories.

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Wave Piston

The wave piston concept is a genuinely novel approach to the possibility of harvesting energy stored in ocean waves. Instead of using brute force and trying to optimise an unsuitable existing technology to a harsh environment the inventors have looked at a series of waves as a system and produced a truly innovative solution. The load-cancelling feature of the design has now been proven in real-environment testing which means that the design is ready to be scaled up and developed for its first deployment site.

By developing a complete system solution to the challenge of cost-effective energy recovery rather than theoretical maximum efficiency of an individual component the guys at WavePiston have come up with what is in my opinion likely to be the first commercial viable wave energy harvesting device.

Endorsement by: **Julian Smith** CENG MRINA. Naval Architect and Structural Engineer