

HALCYON

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Halcyon is a transformative design for the construction of marine enclosures. The design was originally developed for tidal range power. The design was awarded patents in all nine countries where tidal range can deliver utility scale power. The design was modified for offshore pumped storage where it provides a method for large scale storage capable of transforming large offshore wind farms into baseload generators at a fraction of battery storage.

Halcyon Tidal Power Stations

Tidal range power is conventional hydropower in a marine setting. The rise and fall of the tides create a differential head between the ocean and water contained in the marine enclosure. The differential head is then used to drive water through turbines built into the enclosure to generate electric power. Three major experimental tidal range power stations have been built over the past 70 years. It was hoped that tidal range would supply between 15% and 30% of the world's power consumption from utility scale plants. The major obstacle was the high cost of dam construction due to the massive amount of reinforced concrete required. The Halcyon Solution was to support the enclosure against tidal loads by using large diameter pile support initially developed for offshore oil and gas platform. The result is a reduction in concrete requirement by over 80%. The reduction in cost transforms tidal into an economical source of utility scale electric power.

In collaboration with Alstom, NA, Halcyon pioneered a power cycle (the Parallel or Free Flow Cycle) that reproduces the natural rise and fall of the tides within the marine enclosure, thus resolving the major environmental impact of tidal range. In collaboration with Alden Laboratories, Halcyon developed modifications to turbine blades that reduce fish mortality to low levels, resolving the second environmental impact.

The result is marine hydropower at low cost and low environmental impact.

The civil structure has an established design life of 120. During the 30 year debt phase, power is generated at a competitive costs. For the next 90 years of operation, a Halcyon Tidal Power Plant will generate energy a cost below gas, coal, nuclear, wind, solar or any other source (other than possibly a river hydroelectric facility whose debt has been retired).

Because the tides are predictable, the energy produced can be predicted in amount to within minutes, unlike wind and solar that are not only intermittent but also unpredictable.

Halcyon Marine Pumped Storage

The major challenge for all renewables is storage. The Halcyon marine enclosure can be configured into a circular offshore lagoon at depth of up to 60 meters and a diameter that can be adjusted to several kilometers. This requires some proprietary modifications. By pumping water in and out of the lagoon through turbines, the lagoon is operated as a high capacity conventional pumped storage facility.