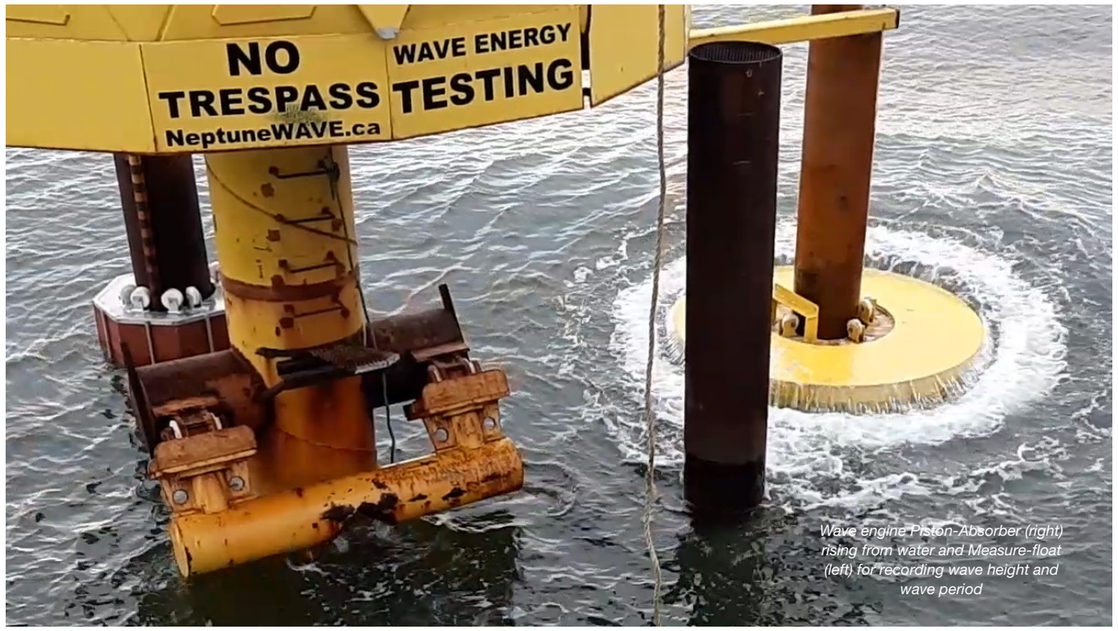
Wave Tidal ENERGY NETWORK

ISSUE 24

COMMUNICATION HUB FOR THE WAVE & TIDAL ENERGY INDUSTRY

NEWS AND VIEWS FROM THE WAVE & TIDAL INDUSTRIES

Cover image: Charles Haynes



Wave engine Piston-Absorber (right) rising from water and Measure-float (left) for recording wave height and wave period

WAVE ENERGY TEST STATION

NeptuneWave.ca, a 100% privately funded corporation, began operations in 2010 building a cottage sized, wave energy, linear generator system

This proved to be more difficult than first expected. A large diameter custom permanent magnet generator was made to increase electrical efficiency and direct drive PTO and tidal compensator patents followed. Four full sized units were deployed and tested by end of 2016.

MAIN CONCERN AND TESTING

In 2017 their main concern was obtaining continuous electricity output for at least 8,000 hours per year which necessitates using the smallest waves. In 2018 an Investigative Use License was granted for five years testing in an energetic wave location off Point Grey in the Georgia Strait, British Columbia.

The device, now called a 'wave engine' using piston-absorbers and piles in the seabed, was tested extensively and the PTO modified to produce continuous electricity from very small (avg. 0.2m) waves.

In October 2019 they connected it to the Vancouver Wave Energy Test Station. This standalone 'room at sea' enables third parties to verify for themselves (with their own equipment) that the claims and projections made, about the continuous electricity produced and amount of power from verifiable waves of various sizes, are true.

FEASIBILITY STUDY

They have completed a feasibility study sponsored by Otary for adding-on larger 24 piston wave engines to Otary's offshore wind turbine

Vancouver Wave Energy Test Station connected to NeptuneWave Engine

monopiles in the English Channel. Each of these, relatively small wave engines, approximately 30m diameter by 15m high is projected to produce over 5,000MWh of electricity per year with a portion of this electricity being output continuously for at least 8,000 hours per year.

kWh/hr		W. Period 2.6	W. Period 3.4	W. Period 4.4	W. Period 5.6	W. Period 6.9	Total Hrs/ yr	% Hrs /yr	Total kWh /yr	% Total kWh / yr
W. Height	0.15	3.0	2.1	1.3	1.3	1.4	3,471	40%	6,361.3	17%
W. Height	0.35	6.6	4.9	2.5	3.2	2.1	2,564	29%	9,899.6	26%
W. Height	0.56	10.0	8.0	4.1	5.2		1,751	20%	11,932.0	31%
W. Height	1.05		15.8	9.7	10.3	6.0	834	10%	8,698.3	23%
W. Height	1.6		21.0	11.6	14.0	12.3	101	1%	1,486.2	4%
Assumes 0.6 efficiency of a small single piston-absorber NeptuneWave Engine							8,721	100%	38,377	100%

Scatter Chart of projected electrical output from the single piston-absorber wave engine

TEST 1

The above scatter chart shows the power projections to be verified from the single piston-absorber wave engine at the Vancouver Wave Energy Test Station. These projections result from full size tank and shop tests which have confirmed the calculations from the physics model of the entire system – from prime mover wave to continuous 3 phase AC output from the generator.

Test 1 will also include a determination of the minimum continuous 'firm' electricity that this wave engine will generate per year in the test wave regime.

TEST 2

Test 2 is concerned with testing the real time optimisation controls in the PTO with human feedback adjustments.

Once the optimum benchmarks are determined for various wave regimes they will be automated by the PTO.

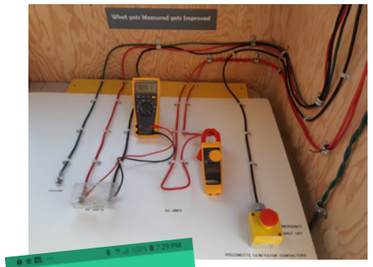
TEST 3

Test 3 uses the included wave measurement-float to determine individual and hourly average wave height and period. These values will be compared with the wave values from a government weather station located 20km due west.

It is hoped a reliable nexus of this data will result. This will enable predictions of the performance of wave engines from NOAA type wave data, which is available throughout the world.

FUTURE

It is expected that the electrical projections in the scatter chart will be verified by the testing data.



Detail of work bench for third party verification testing inside test station

Mobile App for test station data

If this is the case, output projections from larger 24 - 32 piston-absorber wave engine added-on to offshore wind turbine monopiles off Belgium in the English Channel show each wave engine will produce approximately 5,000 to 10,000MWh per year.

Should the results be different than the initial test projections then projections for the add-on wave engines to offshore wind turbine monopiles will be modified accordingly.

NeptuneWave.ca are available to discuss partnership business relationships and invite you to attend the Vancouver Wave Energy Test Station where you can verify power output with your own instruments.

NeptuneWave.ca