

Wave Power Engineering



# WAVE MILL for The Sand Bypass System

Here fore the future

by Ivan Voropaev



# WPE Wave Energy

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- Delivers waves energy 24/7.
- Most concentrated form of renewable energy from the sun.
- Greater energy density than both solar and wind,
- More predictable and greater persistence (consistency).
- 15-20 x available energy per square meter than wind or solar.



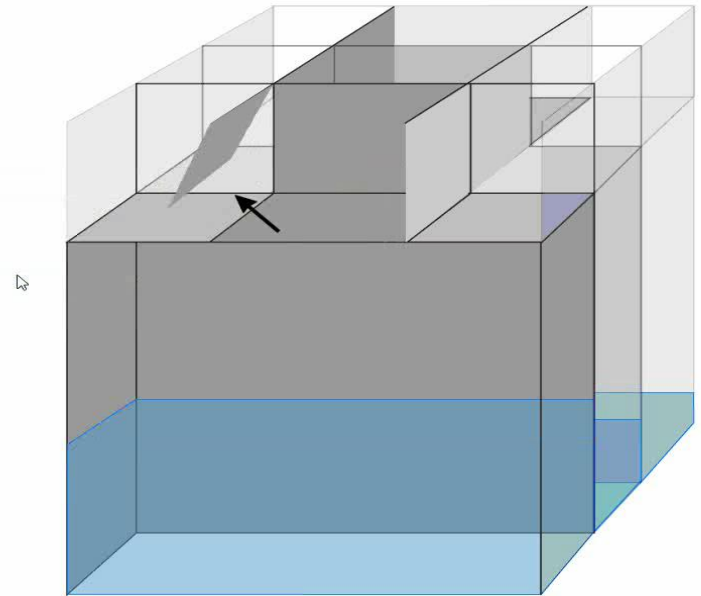
# WPE Wave Energy



Annual average wave energy flux in kW per metre of wave front

# WPE Wave Mill: concept

- Unique technology.
- Efficient conversion of wave to electricity.
- Patented wave energy conversion cycle.
- A continuous unidirectional air-flow.
- No mechanical parts (flaps are neoprene).

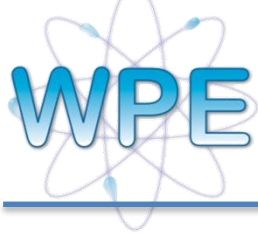




# WPE Wave Mill: proven technology

- A small number of laboratory prototypes were built and tested in a wave flume facility.
- A full scale prototype was built and tested in Moreton Bay, Brisbane.
- Independent experts have confirmed the Wave Mill's performance.
- **Measured efficiency of wave to wire is 32%.**
- **Wave Mill economics is competitive with conventional power plants.**

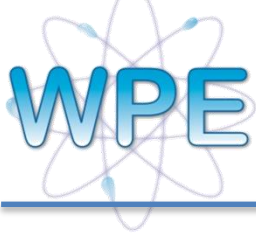




# Wave Mill in the Moreton Bay

- Wave Mill will generate power at 0.2m waves.
- Output depends only on the input from waves.
- Wave Mill is scalable.
- Cost of kWh \$0.12 from small and mid range Wave Mills.
- Cost of kWh \$0.04 from large Wave Mills.

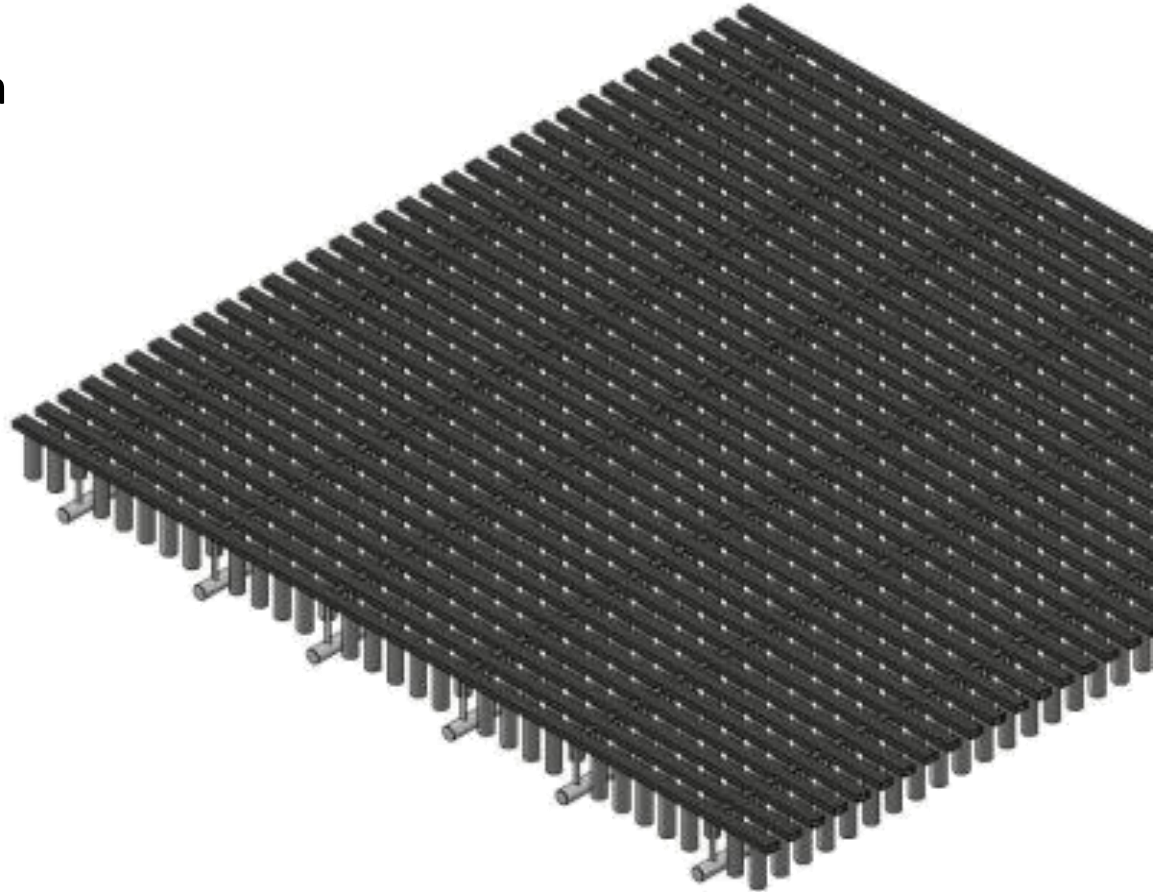




# How commercial unit can look?

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- The size of unit depends on the location and power demand.
- Average input from waves in SE QLD is 10kW in one linear meter.
- 100m X 100m unit will deliver 0.5MW in normal weather.
- 1.6MW in windy weather



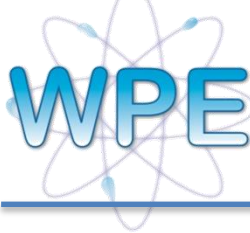


# WPE Wave Mill Applications

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- Power generation for the close to shore customers.
- Offshore support facility with embedded power supply.
- Floating foundations for offshore oil rigs and offshore wind projects.
- Wave attenuation, coastal protection and beach accretion.

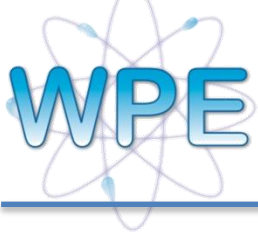




# WPE WM Advantages

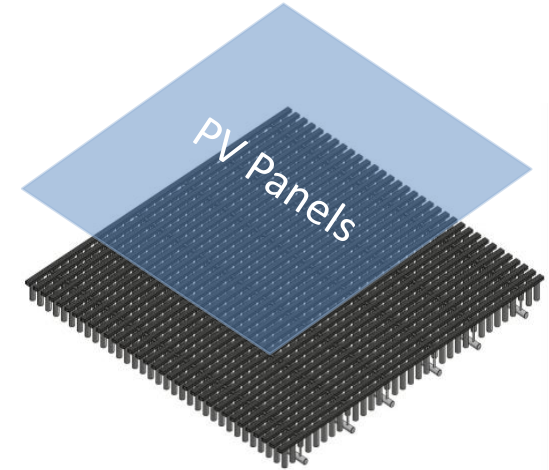
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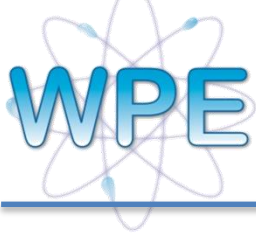
- **Production and operational cost.**
  - WM has a modular design.
  - Most of the parts and materials come off the shelf.
  - HDPE pipes for OWC's, structural mesh and regular wind turbines.
  - Cost of the 150m<sup>2</sup> unit for the Bass Strait is approx. \$7M - \$10M. Average output - 5MW.
  - The same size unit for S.E.QLD will cost less, but power output also will be less.
- **Long life span.**
  - All structural elements located above the water.
  - Unit does not have any moving parts.
  - All cleaning and maintenance can be done on board.
- **Uninterrupted power supply.**
  - The Wave Mill will produce power as long as there are passing waves.
- **Survivability.**
  - The WM's does not roll on the wave like a conventional vessel.
  - It is stiff and stable.
  - To sink, significant number of the OWC's must be destroyed or taken off the unit.



# Wave Mill for The Sand Bypass System

- Provides 24/7 power supply
- WM's deck is thousands of m<sup>2</sup> for PV panels
- WM is detached breakwater, which promote the accumulation of sediments, and hence shoreline accretion





# Wave Mill for The Sand Bypass System

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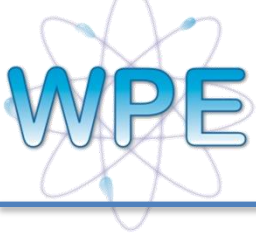
**We propose to build a small unit.**

Proposed sizes:

- a. 50m long, 50m wide, OWC's height is 3m.
- b. Two lines of 100m long and 10m wide

Estimated output: 90kW from 1.5m waves. And 240kW in windy weather. Our estimations will be reviewed by experts from UQ and Coastal Management Centre.

Running Wave Mill unit will be tested by the scientists from the Australian research organisations. Independent experts will provide a report and recommendations for the project stakeholders.



# Wave Mill for The Sand Bypass System

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## Proposed project contributors:

**Wave Power Engineering** builds WM unit and moored it in the proposed location.

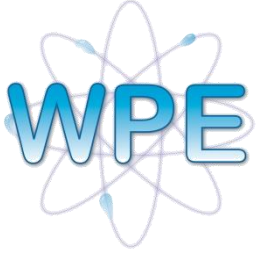
**GCWA** provides solar panels to be installed on the WM's deck.

**Port of Brisbane** provides transportation and mooring

**The Griffith Centre for Coastal Management** provides metering and technology inspection

**Griffith University** provides testing and research

**University of Queensland** provides testing and research



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“As discussed previously, the Griffith Centre for Coastal Management – based at the Gold Coast Campus of Griffith University – is pleased to be involved with your company in the development of your wave power technology.”

Yours Faithfully,

Rodger Tomlinson  
**Professor and Director**

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Australia





**Thank you**

Wave Power Engineering Pty Ltd

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[www.wavepowerengineering.com](http://www.wavepowerengineering.com)