# Wave Energy Converter Power from Sea State

Wave power per metre of crest from significant wave height and energy period in deep water, and the absorbed power and annual energy of a wave energy converter.

**Method:** Deep-water wave energy flux and capture width

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Significant wave height | 2.5000 | m |
| Energy period | 8.0000 | s |
| Device width (characteristic dimension) | 20.000 | m |
| Capture width ratio | 25.000 | % |
| Rated power | 750.00 | kW |
| Availability | 90.000 | % |
| Seawater density | 1,025.0 | kg/m³ |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Wave power per metre of crest | 24.514 | kW/m |
| Absorbed power (capped at rated) | 122.57 | kW |
| Capture width | 5.0000 | m |
| Annual energy if this sea state persisted | 966.32 | MWh |
| Capacity factor in this sea state | 14.708 | % |

**Notes for this case**

- Deep-water irregular waves: P_w = ρg²H_s²T_e/(64π) ≈ 0.49H_s²T_e kW/m. For annual energy, weight the absorbed power over the site's scatter diagram of sea states; this sheet treats one sea state.

## Formula and method

$$P_w = \frac{\rho g^2 H_s^2 T_e}{64\pi}, \quad P_a = \min(CWR \cdot B \cdot P_w,\ P_r)$$

### Variables

| | | |
|---|---|---|
| $H_s$ | Significant wave height | m |
| $T_e$ | Energy period | s |
| $B$ | Device width (characteristic dimension) | m |
| $CWR$ | Capture width ratio | - |
| $P_r$ | Rated power | W |
| $A_v$ | Availability | - |
| $\rho$ | Seawater density | kg/m³ |
| $P_w$ | Wave power per metre of crest | W/m |
| $P_a$ | Absorbed power (capped at rated) | W |
| $B \cdot CWR$ | Capture width | m |
| $E$ | Annual energy if this sea state persisted | J |
| $CF$ | Capacity factor in this sea state | - |

### Method and standards

Wave energy flux.

### Assumptions and limits

- Deep water; one sea state; constant capture width ratio.

### References

Deep-water wave energy flux and capture width

## Report details

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|---|---|
| Report reference | FCC-ZGMW-JA44 (the same inputs always give the same reference) |
| Generated | 23 November 2026, 17:42 UTC |
| Calculator | Wave Energy Converter Power from Sea State |
| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 22 November 2026 |
| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/environmental/geothermal-ocean/wave-energy-converter-output

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.