

# PowerCone® Tidal

from Biome Renewables

## The Challenge of Tidal

One of the main issues faced in the emerging sector of tidal energy, is the Levelized Cost of Energy (LCOE). This is driven by a number of factors in the design of the turbine, and the harsh marine environments in which turbines operate. The thrust that is produced by a turbine in full power operation is significant, and these design-driving load cases drive increase engineering requirements in turbine foundations.

The increase in foundation steel and concrete along with turbine components such as bearings and other structural components, drive up the LCOE of tidal projects.

These facts make the case for improving rotor design. By significantly improving the design of how we extract power from immense tidal forces, we are able to impact all downstream aspects of tidal development.



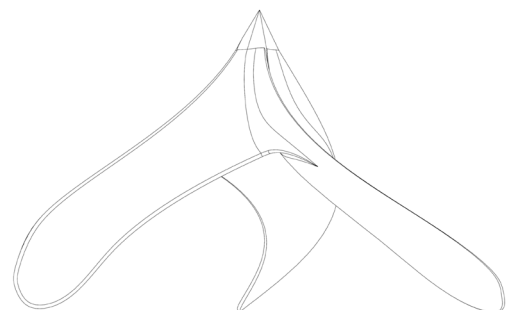
## Turning the Tide

**Introducing PowerCone Tidal, pushing tidal rotor and turbine design to the next level.**

PowerCone Tidal is a fully-imbedded rotor design using Biome's patented PowerCone® geometry to unlock increased tidal power potential.

Research and development to date has revealed a marked reduction in design driving thrust loads coupled with an increase in power performance, especially in the beginning of the power curve, a combination that marks a potential breakthrough for the industry.

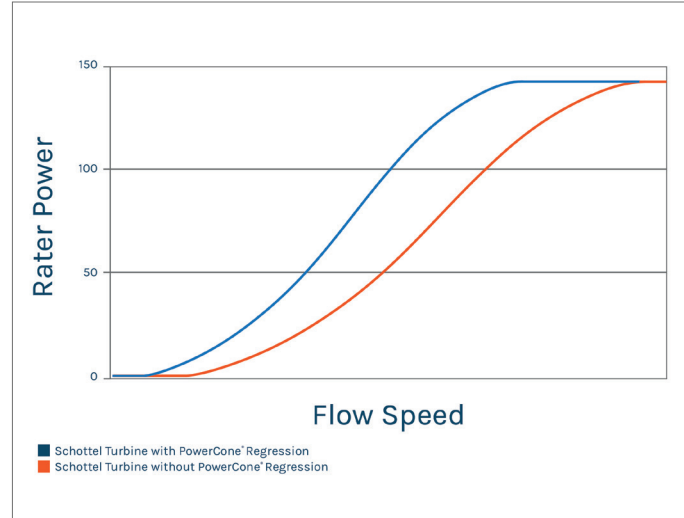
- + Reduces design-driving thrust loads by an average of 10% .
- + Increases power output, especially in low flow regimes below 1.4 m/s by up to 2X.



# Reducing the Levelized Cost of Energy (LCOE)

PowerCone Tidal allows tidal turbine developers and power producers to reduce the LCOE of Tidal in three key ways.

- + Developers and utilities can improve the energy yield from sites, increasing the amount of predictable renewable energy that flows into the grid.
- + With the potential for tidal energy to function as a form of reliable baseload power for grids, PowerCone Tidal is able to go one step further and improve the Capacity Factor of projects.
- + With improved hydro-dynamics in the rotor, asset owners can reduce downstream turbine CAPX costs and improve lifetime OPEX costs with reduced loads on the turbine.



Power Curve comparison on a Schottel turbine rotor

## Unlocking Baseload Power

**With 80-90% of global tidal capacity coming in low to medium speed sites, PowerCone Tidal has the potential to finally unlock the enormous potential of our seas.**

Our seas have untapped potential to be sources of reliable renewable base-load power, at cost structures that work with current market economics. Working with Andritz Hydro Hammerfest (UK), a leading global tidal turbine developer, Biome is creating an integrated PowerCone rotor and turbine that can be economically deployed in lower speed sites, higher turbulent sites and sites with complex underwater terrain - all to deliver the best LCOE in the industry.

At Biome Renewables, we are inspired by billions of years of evolution to create clean energy technologies that enable the Global Energy Transition. Leveraging intelligent nature-inspired solutions, we use engineering and evolved design to develop practical solutions across a wide range of problem areas. In this way, we unlock the potential of innovation to change the way the world generates power in the 21st century.

This is the power of Evolved Design.

