

Company Presentation



February 2019

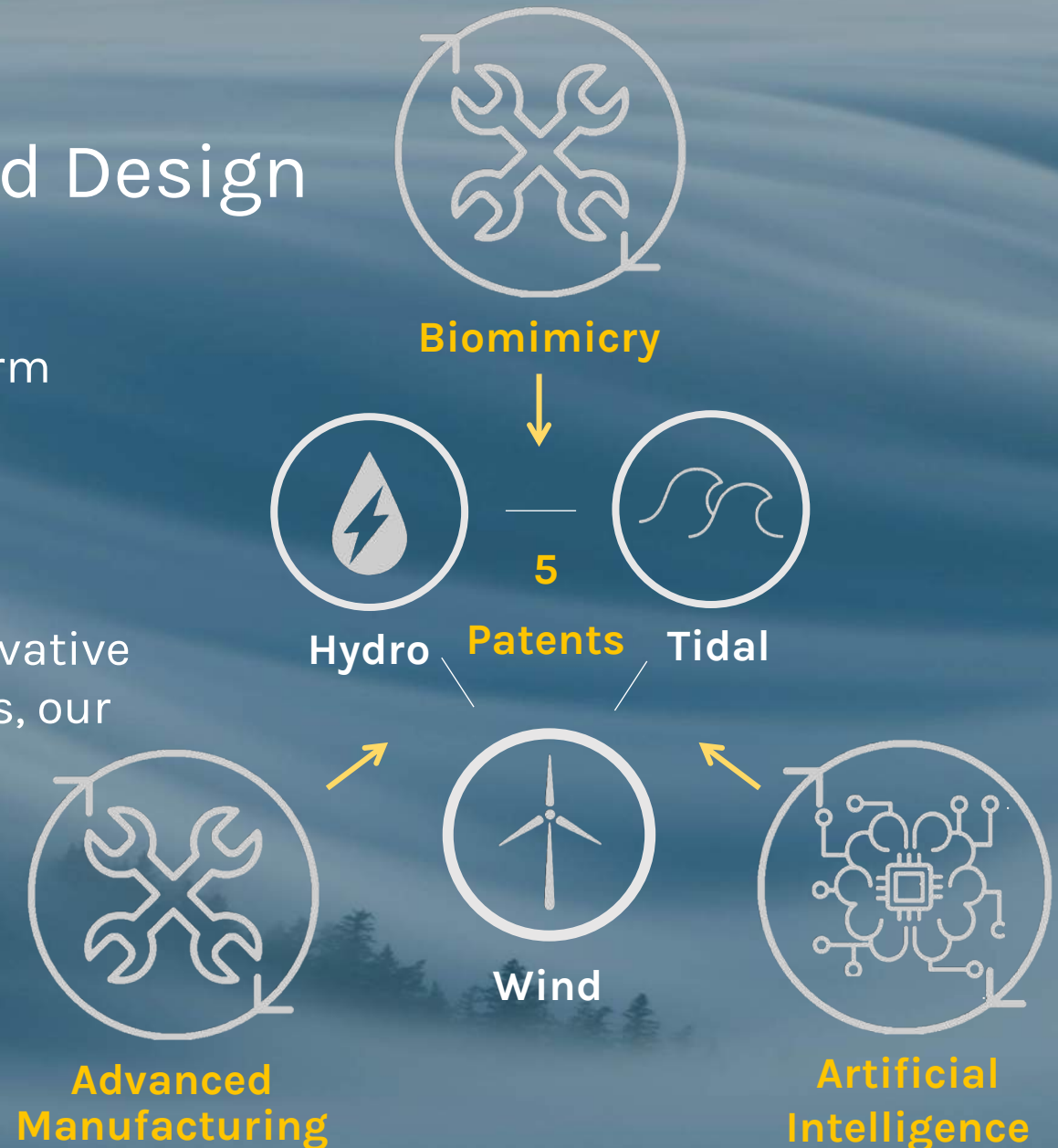


Harness the Power of Evolved Design

Biome Renewables is an industrial design firm that employs the power of nature to create a sustainable future.

Our biomimetic design process applies innovative thinking to continually improve our products, our company, and our world.

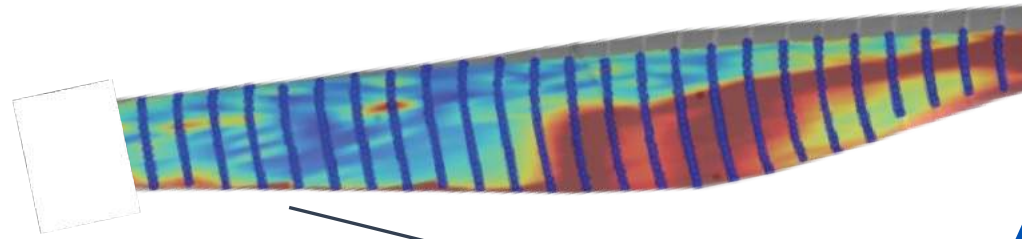
This is the power of **Evolved Design**



PowerCone targets the #1 cause of aerodynamic loss

Root Leakage develops due to blade geometry at the root, leading to an area of low pressure around the hub, causing air to detach prematurely from the blade.

- Drives aerodynamic inefficiencies and increased vibration and loads
- Decreases component lifetimes and drives O&M costs, decreasing turbine profitability



PowerCone - a turbine retrofit that unlocks wind power's true potential

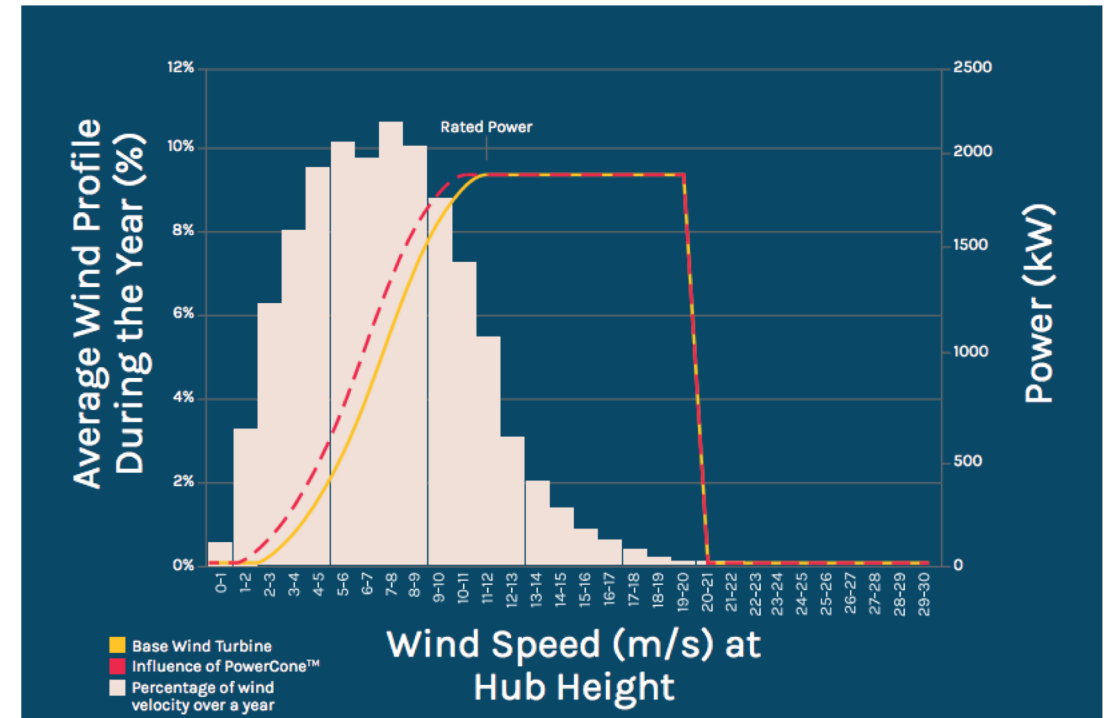
- A performance increase of up to 13% AEP.
- A turbine retrofit that channels incoming wind onto the blades to address root leakage.
- The result is not just more power, but power from a place where no bigger blade or smarter software can find it.





PowerCone delivers industry-leading benefits

- Increases AEP by 10-13% by decreasing cut-in by 0.8m/s
- Reduces loads on rotor
- Reduces acoustic noise
- Increases yield and capacity factor



The baseline power curve and wind speed distribution seen here comes from a generic 2MW turbine located in an IEC Class IIa wind regime, and is reflective of expected power gains.

Wake Loss is the #1 cause of wind farm loss

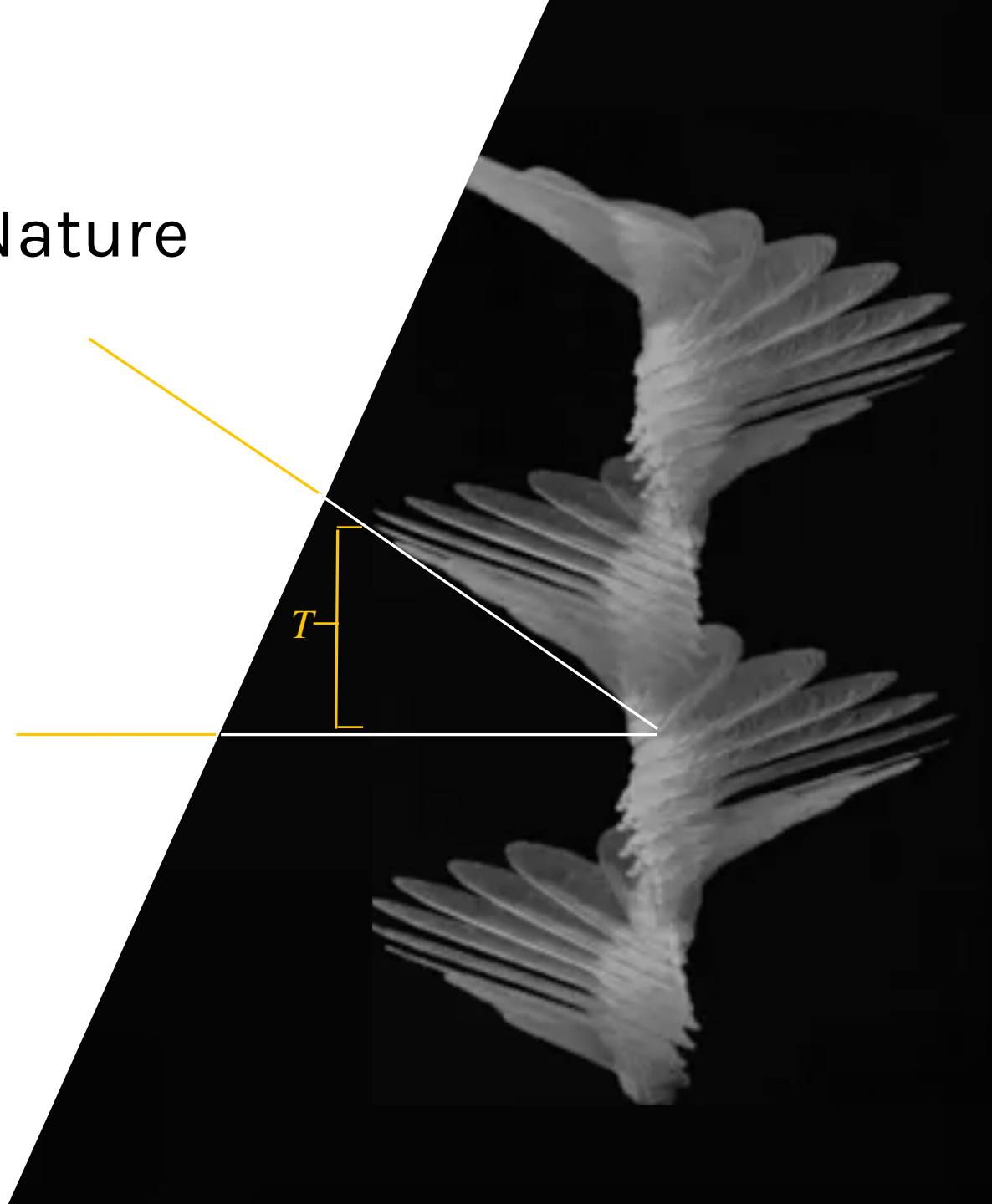
Wake behind the turbine contains less energy than the freestream air. Shortening the wake can improve wind farm performance.

- Due to the cost of land, turbines are sited as close together as possible, risking wake loss
- Improving wake recovery can dramatically improve wind farm performance and siting economics of future projects



Unlocking Time by Mimicking Nature

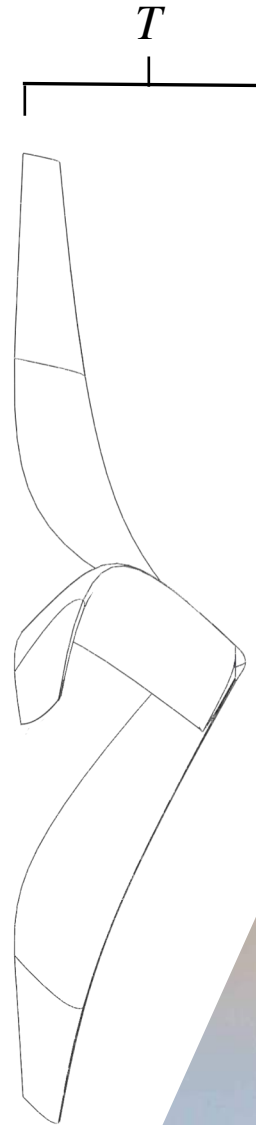
- As a maple seed falls to the ground, it moves through the air with a pattern of least resistance, achieving maximum aerodynamic efficiency.
- The PowerCone blades rely on the same principles of time- dependant energy efficiency as a maple seed.
- By absorbing gusts and channeling wind along its blades, it increases torque.



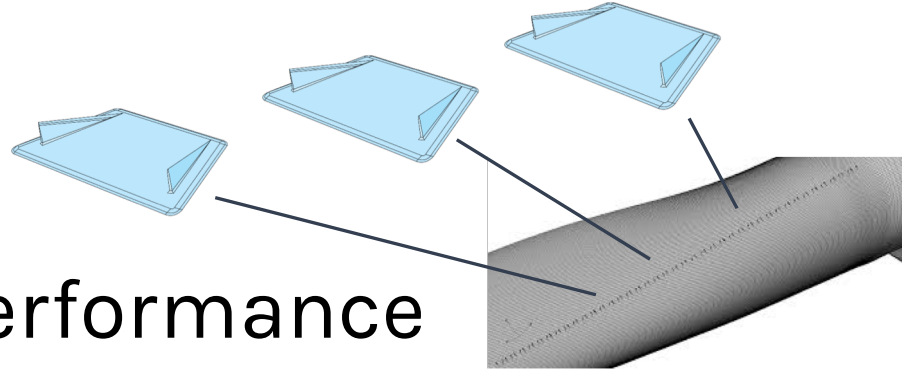
Cutting Through

The kingfisher owes its reputation to how its beak allows it to plunge through the water with barely a ripple; in effect, moving the fluid around itself at a precise rate.

The PowerCone draws on these principles, cutting through turbulent flow to harness power and deliver smooth air to the blades.



Our Competition can't match our Performance



- Vortex Generators are on thousands of turbine globally and increase Annual Energy Production (AEP) by 0.5-2%.
- Hard to measure impact, frequently fall off, and don't fully address problem.
- Sold by:

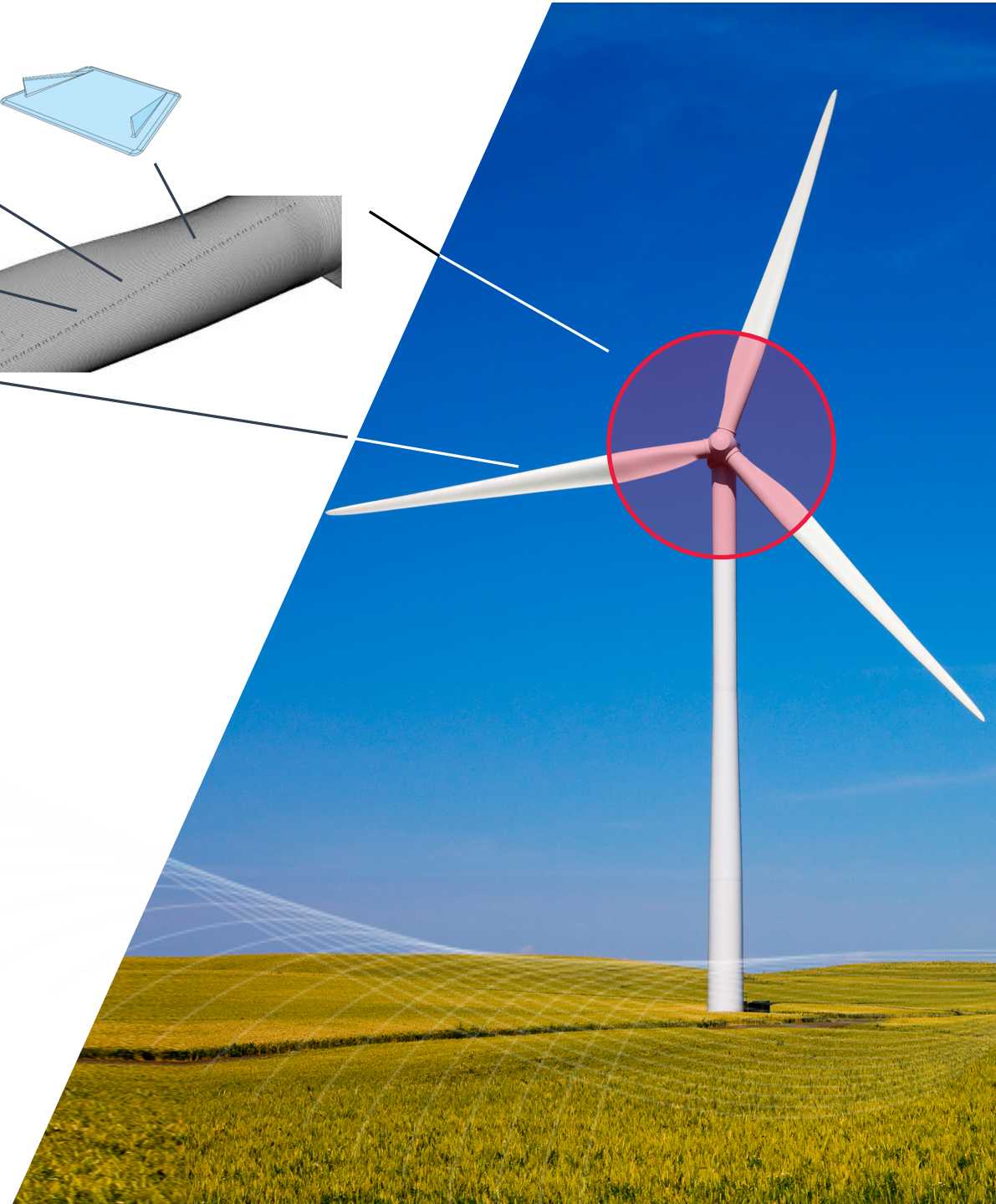


Vestas

SIEMENS

SMART  **BLADE**


POWER CURVE



Skyway 8 PowerCone Pilot, Q2 2019

A side-by-side analysis of the PowerCone in Shelbourne Ontario measuring:

- Turbine performance and AEP improvement
- Loads on the rotor, tower, main bearing and PowerCone, along with vibration on drivetrain.
- Acoustic noise emissions (E-Test)

➤ Partners:  





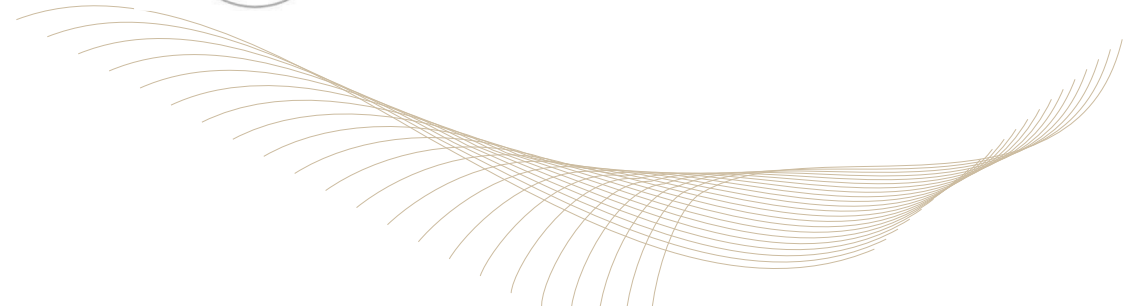








Partners





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