



Concentrated Wind Power (CWP)
Presentation to REOLTEC
June 2021

1. W'wave's (very brief) Introduction
2. Collaborations with wind industry

1. W'wave (very brief) Introduction

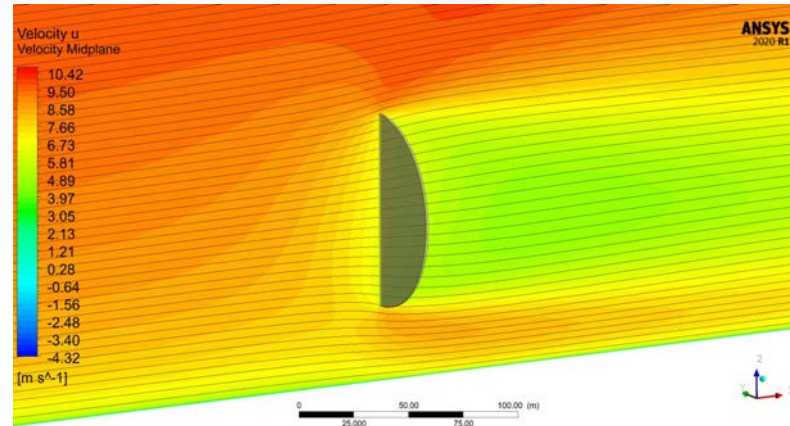
W'wave: Improving wind



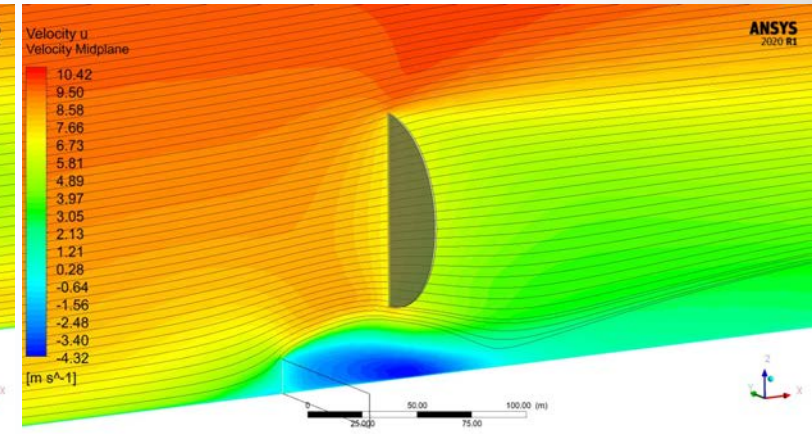
W'WAVE is the **PIONEER** of a new technological development:
CONCENTRATED WIND POWER (CWP).

It focuses on exploiting the energy of the **wind that flows in the atmospheric layers below the turbine rotor**. We do this by changing artificially the topography of the site installing cost-efficient structures that optimize the wind profile throughout the turbine's rotor. See Fig below.

Wind profile without Concentrator

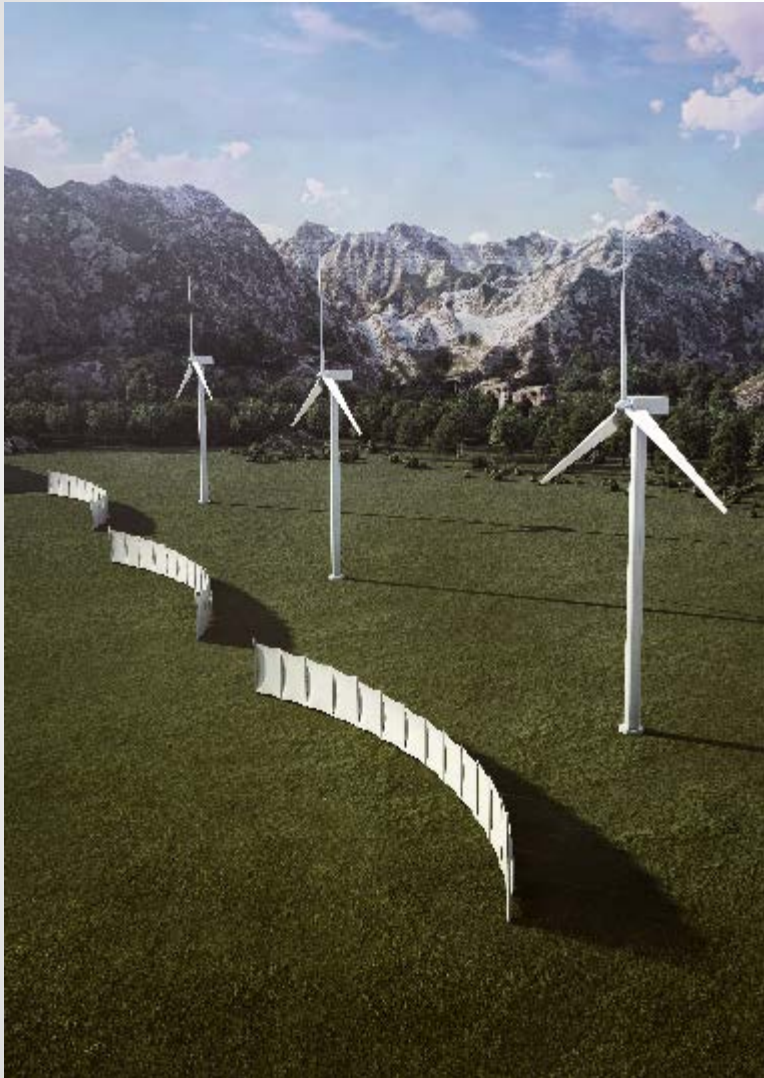


Wind profile with Concentrator



1. W'wave (very brief) Introduction

W'wave: Improving wind



W'wave improves the initial site conditions so that the WTG can produce more energy.



We target to achieve increases from **4%** to **15%** of the mean wind speed of a site that is perceived by the turbine (shifting the wind speed's frequency curve to the right).

1. W'wave (very brief) Introduction

W'wave: Improving wind



The objective is to artificially transform lower wind speed sites into higher wind speed sites to optimize the LCoE of the wind farm.

Class	Class III		Class II		Class I	
Sub-Class	Low	High	Low	High	Low	High
Wind speed (m/s)	7,0	7,5	8,0	8,5	9,0	9,5
CWP effect*	[Diagram showing four blue arrows of increasing length pointing right, representing the CWP effect for each class: Class III Low, Class III High, Class II High, and Class I High.]					

* Illustrative: A site-specific analysis is needed to determine the level of optimization.

1. W'wave (very brief) Introduction



Why is this important to our potential customers (i.e.: Wind farm owners, operators and developers)? (I)

Our Technology:

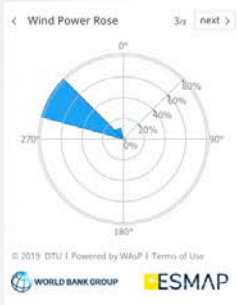
- ✓ Can make wind turbines produce **MORE** renewable energy
- ✓ Can make wind farms **IMPROVE** competitiveness & profitability
- ✓ Can **OPTIMIZE** future as well as **EXISTING** wind farms.

1. W'wave (very brief) Introduction



A big market opportunity.

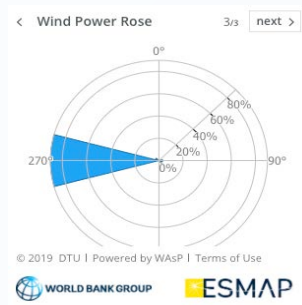
What is the market for Concentrated Wind Power? Currently, the concept can work for wind farms with a clear predominant direction. As the technology matures in coming years, we will increase the potential market. However, the market for wind farms with clear predominant direction (>70% power coming from a 60° wind rose range) is already big. Some examples (non-limitative):



California (US)



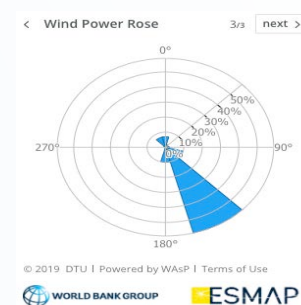
Northeast Brazil



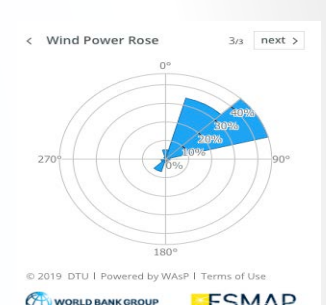
India



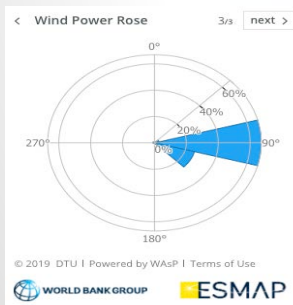
South Mexico



North Mexico



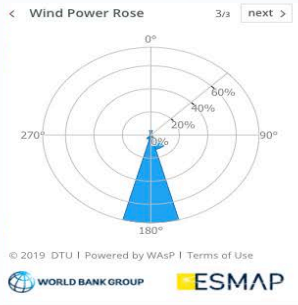
SouthEast China



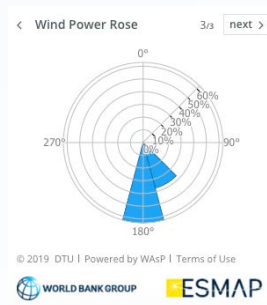
North Australia



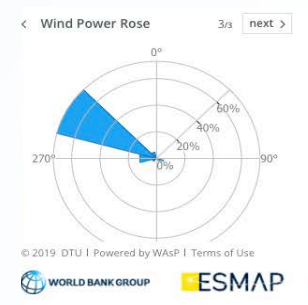
Colombia



Chile



Perú



Ebro Valley (Spain)



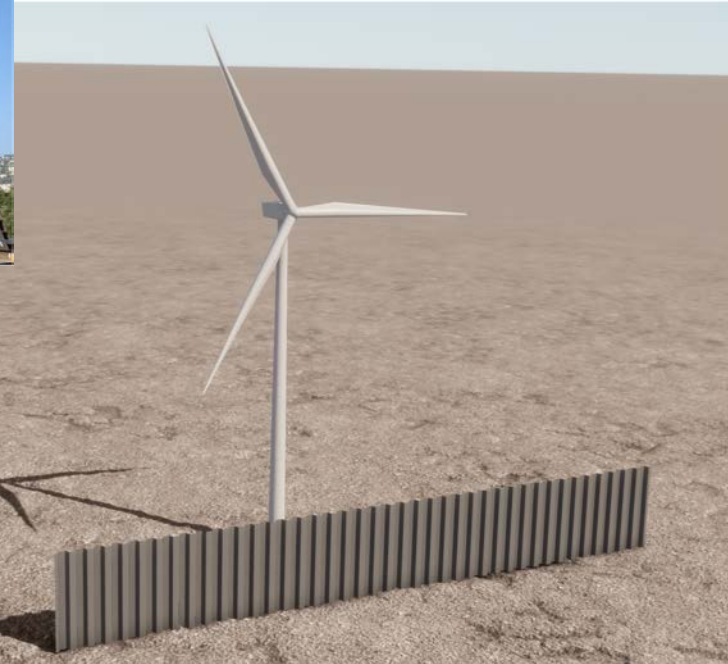
Occitanie (France)

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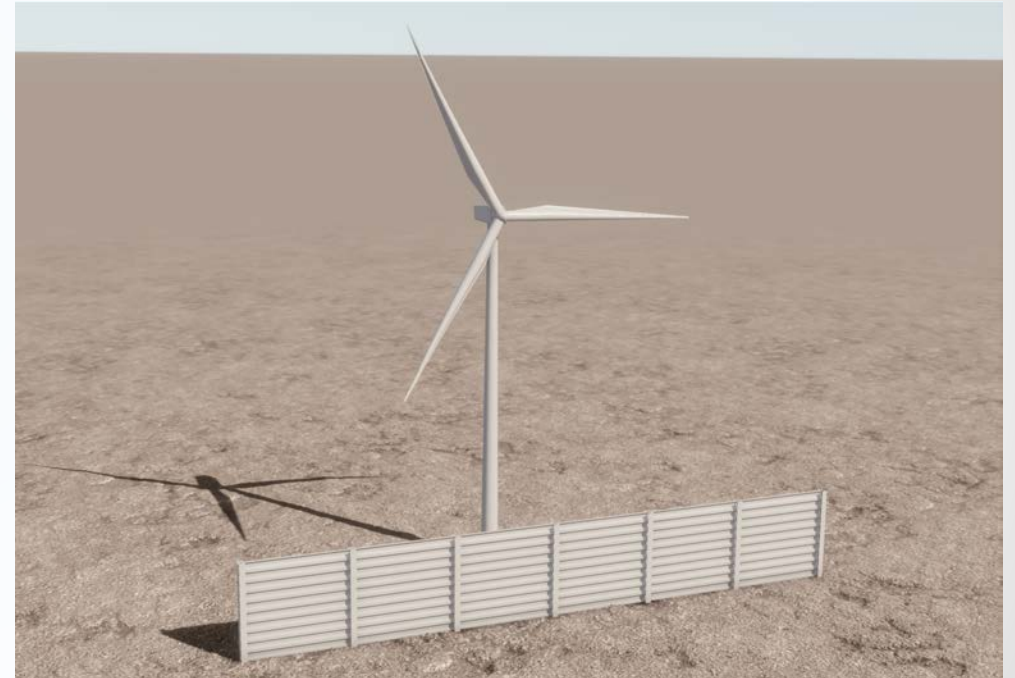
Construction of Concentrators with steel is advantageous, technically and commercially



STEEL SHEET PILE Concentrator (SSPC)



KING POST Concentrator (KPC)



1. W'wave (very brief) Introduction



W'wave has received support and been collaborating with several institutions for its early developments



1. W'wave (very brief) Introduction

The proposed technology can provide a good business case for the Customer



Expected Business Case for the Customer:



- **Wind speed increase:**
 - **We can increase from 4 to 15% the average wind speed** in the predominant direction. E.g.: In a 8.5m/s-average wind site, transform it to a 8.9-9.8m/s-average wind site.



- **Energy production assessment:**
 - **We can increase cost-effectively from 5% to more than 35% the yearly energy outcome** of a wind turbine.



- **Expected Financial Business Cases for the wind operator:**
 - **Project IRRs from 10% to 60%.**

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2. Collaborations with wind industry

2. Collaboration with wind industry

We want to collaborate with the wind industry value chain to provide value to the Customer.

Collaborations with wind industry:



- **Developers:**

- Business case assessments for existing and future wind farms.
- Environmental Assessments (National & International).
- Permitting (National & International).



- **Turbine Manufacturers**



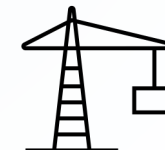
- **Component suppliers**

- **Geotechnical services suppliers**



- **Civil Works Suppliers**

- **Transport, Mechanical Assemblers & Crane suppliers**



2. Collaboration with wind industry



We want to collaborate with the wind industry value chain to provide value to the Customer.

What we are good at:



- **Structural & Product Engineering**



- **Computerized Fluid Dynamics (CFD)**



- **Concentrated Wind Power Business Case Assessments**



Thanks for your attention.

Any question?

E-mail: Manuel.Alcocer@wwavenet.com

Tel.: +34-607-263-818