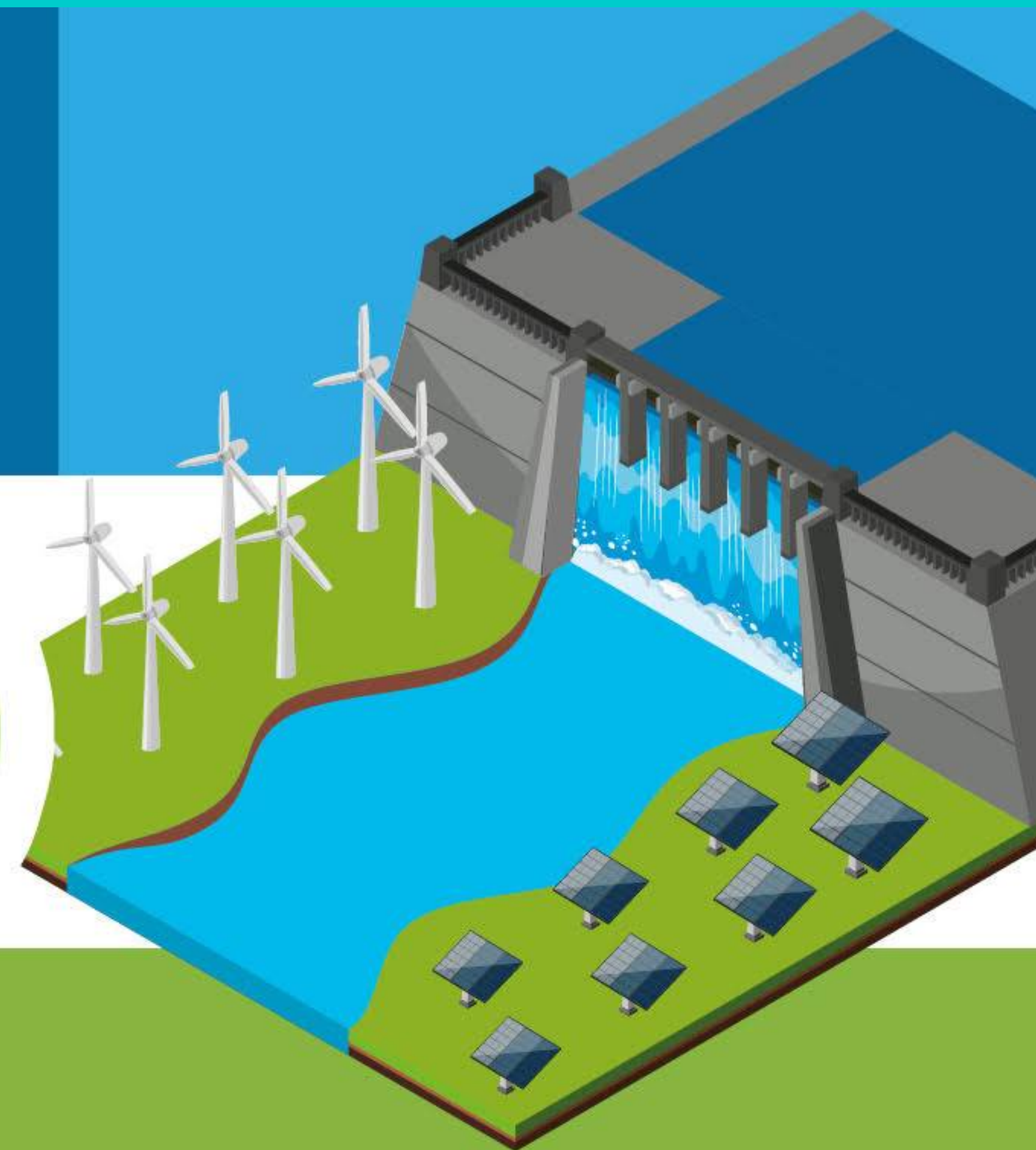




STARTUP COMPETITION

il valore dell'acqua 4.0

Edizione 2020



Organizzato da:



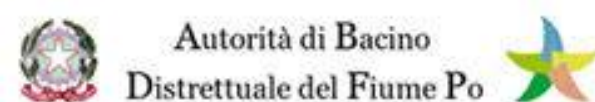
Coordinato da:



In collaborazione con:



Con il patrocinio di:





ENERGIES FROM A VARIABLE NATURE

DISCOVER A NEW ENERGY
CONVERSION CONCEPT

The Wind & the City

A Circular Chance

Are we harvesting all the energy that Nature is offering to our Cities? There is a particular wind blowing below conventional wind turbines: the Urban Boundary Layer, that is nowadays wasted.

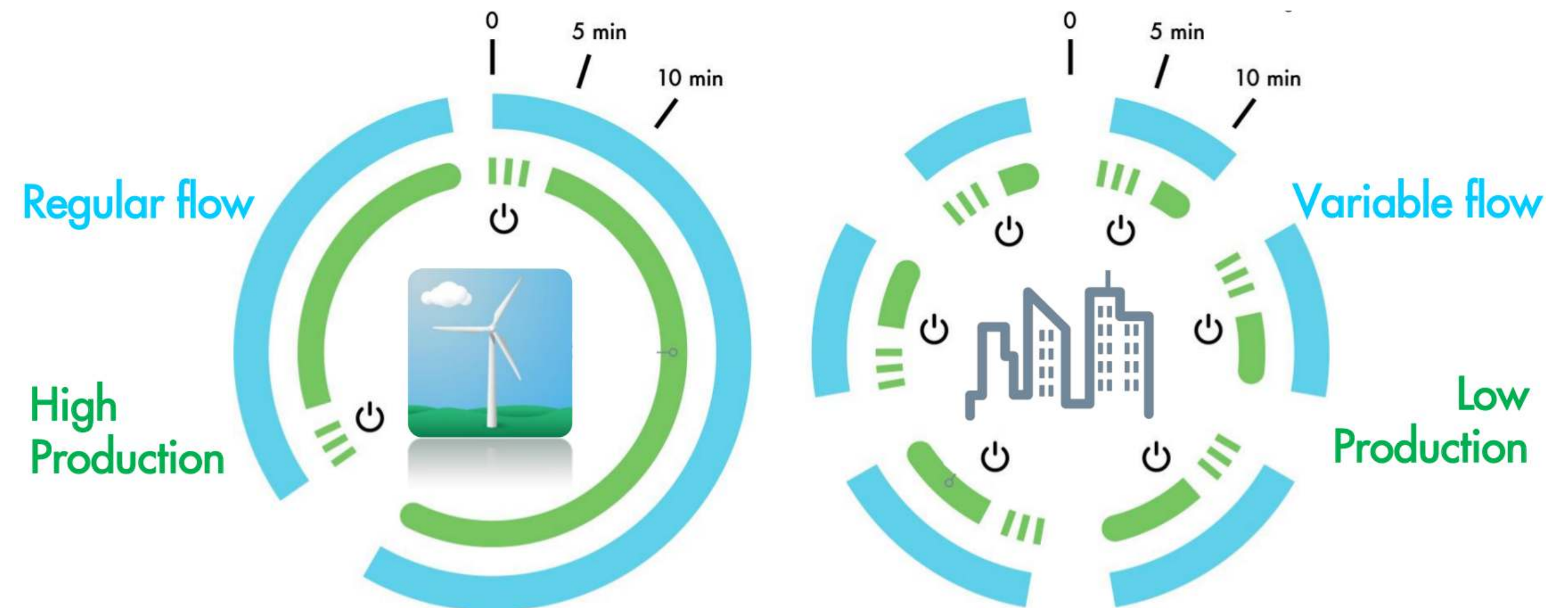
Distributed wind energy generation is a circular chance for the Cities, where lives 60% of our Planet.



A solution for Urban Environments

The cities could harvest energy from wind & water, but the variable flows found in the urban environment today reduce efficiency by more than 60%.

The pain point is the technological gap between conventional off-shore and on-shore applications where regular flow allows high production, and potential built environment applications offering a variable flow where the conventional machine continues to switch on and off, with a low level of production.



Always adapt to Change!

A key performance indicator in Natural systems

Variable flows introduce two great challenges:

- the Yaw challenge for standard Horizontal Axis Wind Turbines: frequent changes in wind direction force the machine to keep yawing, without really setting up for production

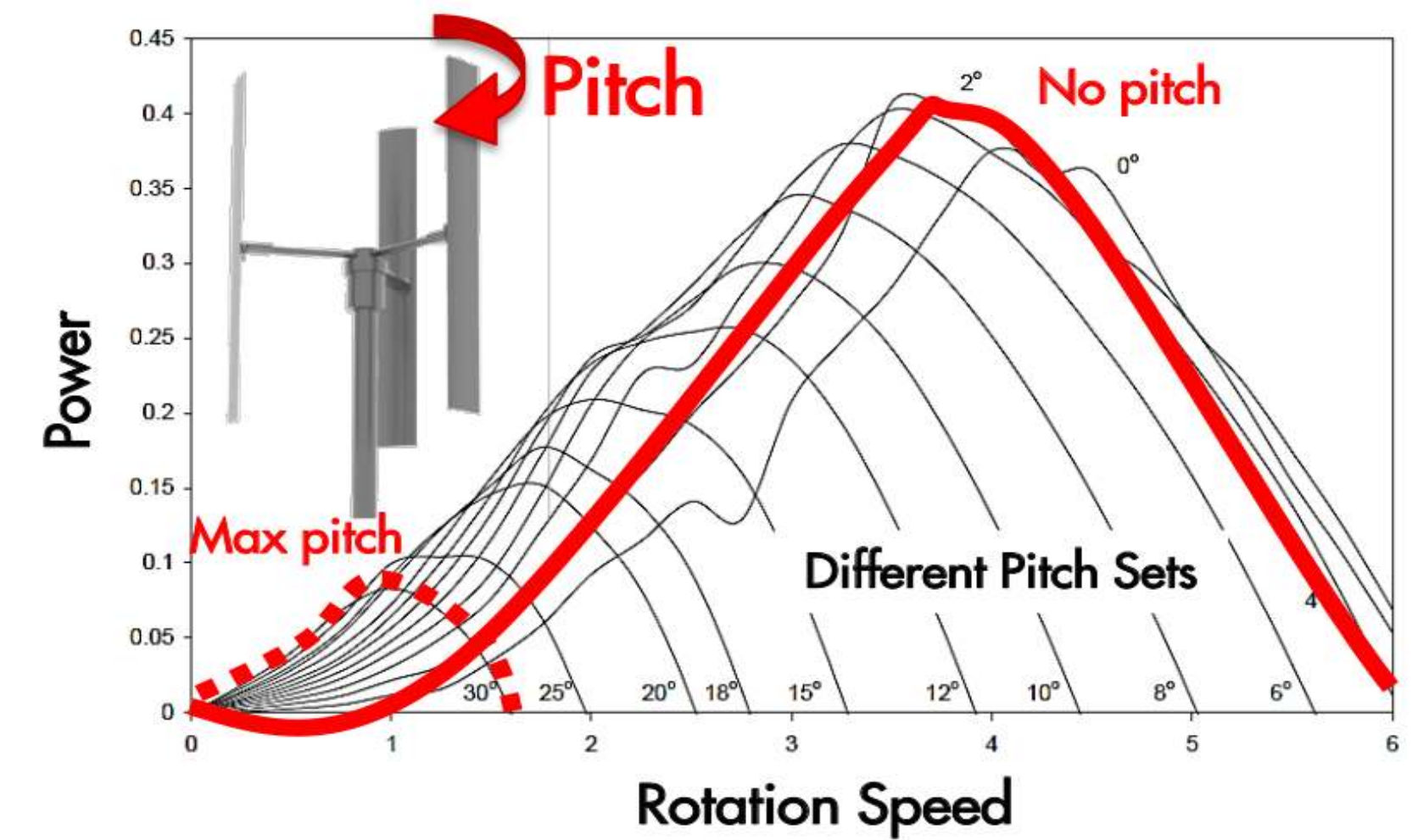
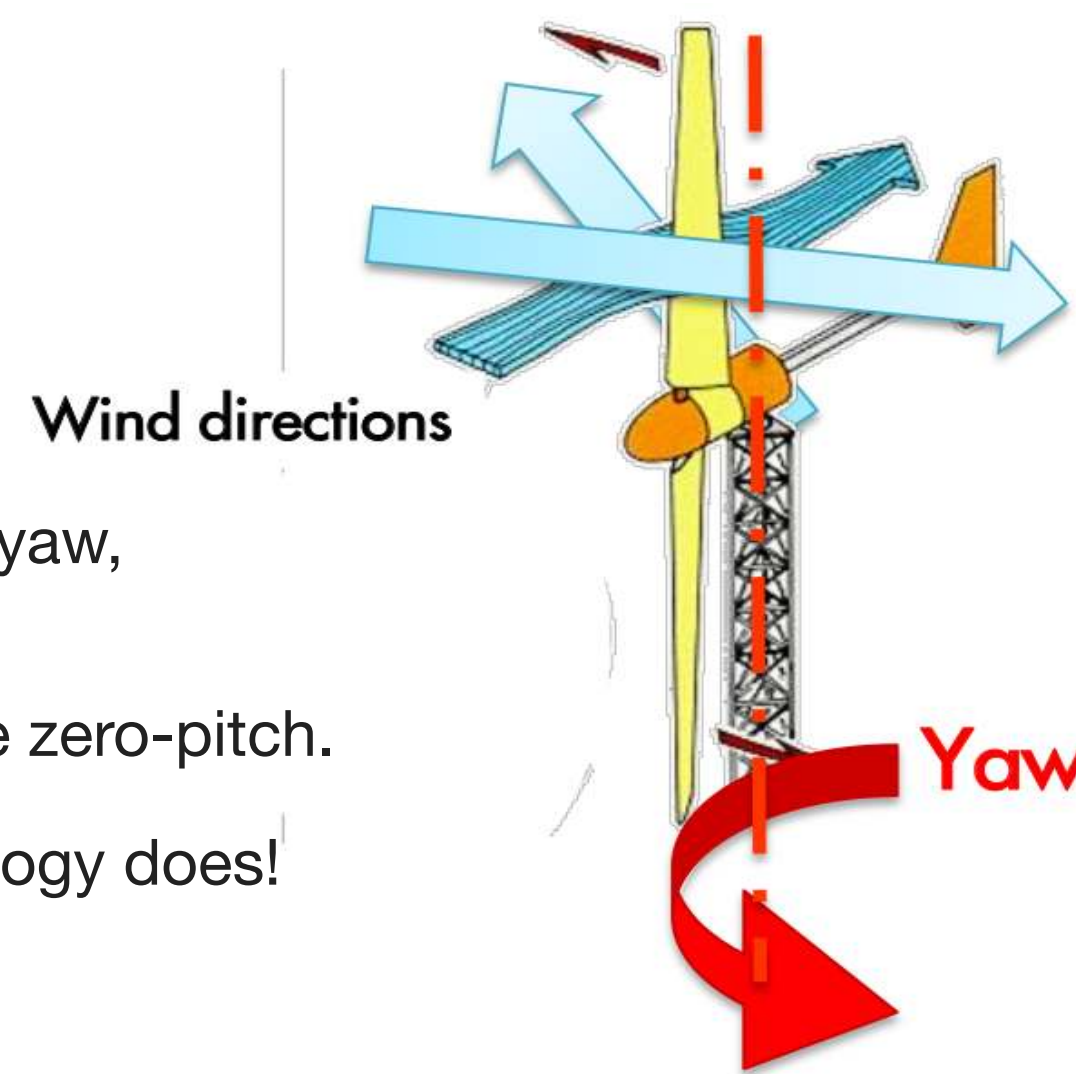
- the Pitch challenge for Vertical Axis Wind Turbines: they do not need to yaw, but with no pitch, the machine cannot self-start.

With a state-of-art cam-driven pitch the machine self-starts

but at optimal rotation speed its production is only 25% compared to the zero-pitch.

If we could just have both on the same machine ... our V-Stream technology does!

Wind directions

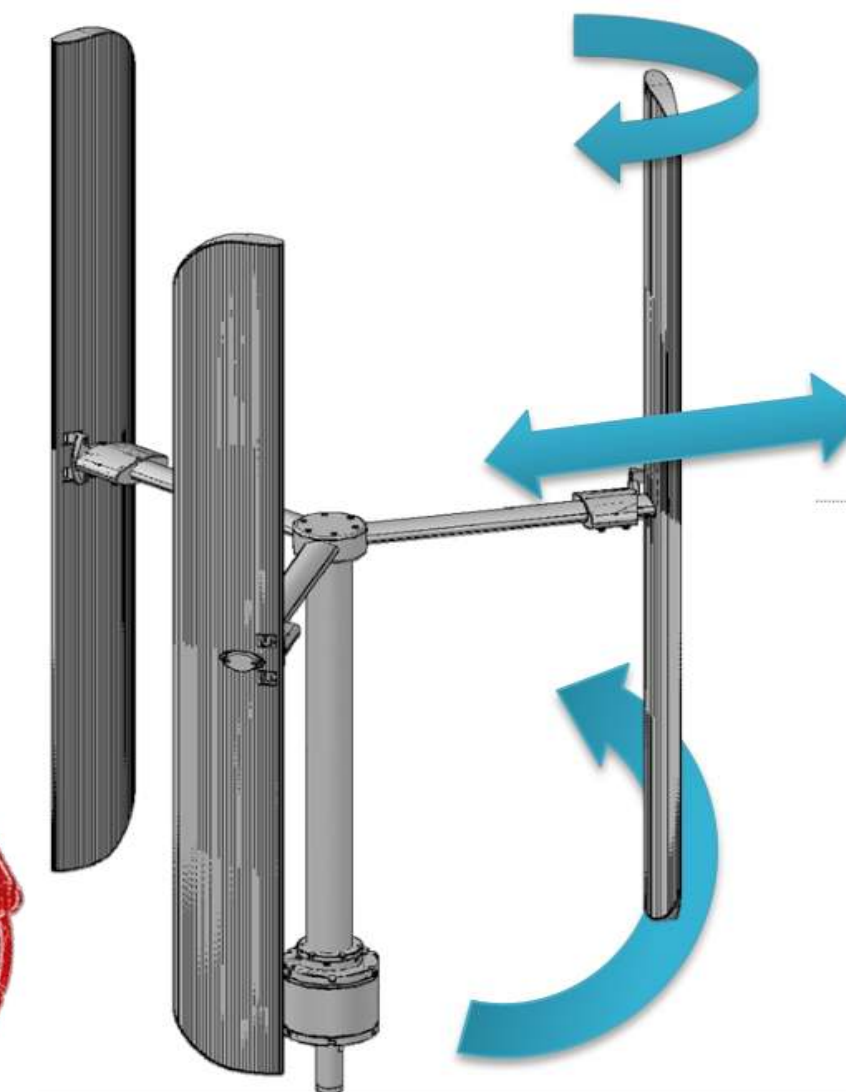


How does it work?

3 degrees of freedom arise spontaneously during the free movement of any blade in the air or in the water: pitch, diameter and rotation.

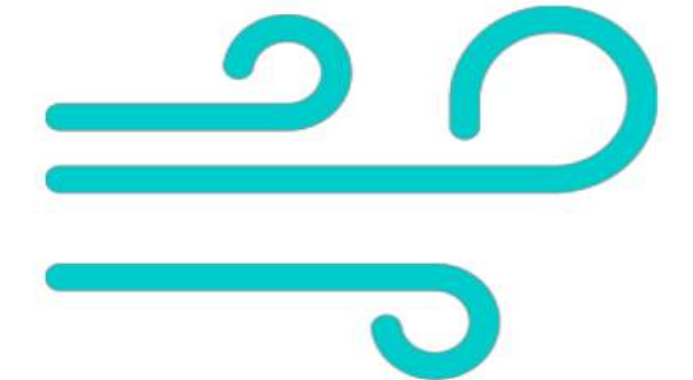
Our solution is called V-Stream as it interacts with the Variable Forces of Nature and self-regulates them to maximize energy production.

No external forces, no actuators, no servo-motors, no sensors.
Electricity is only a product of the mechanical energy conversion,
and is present below the electrical generator.
Maximum energy just by Equilibrium with the Forces of Nature.



✓ Pitch

✓ Diameter



✓ Pitch

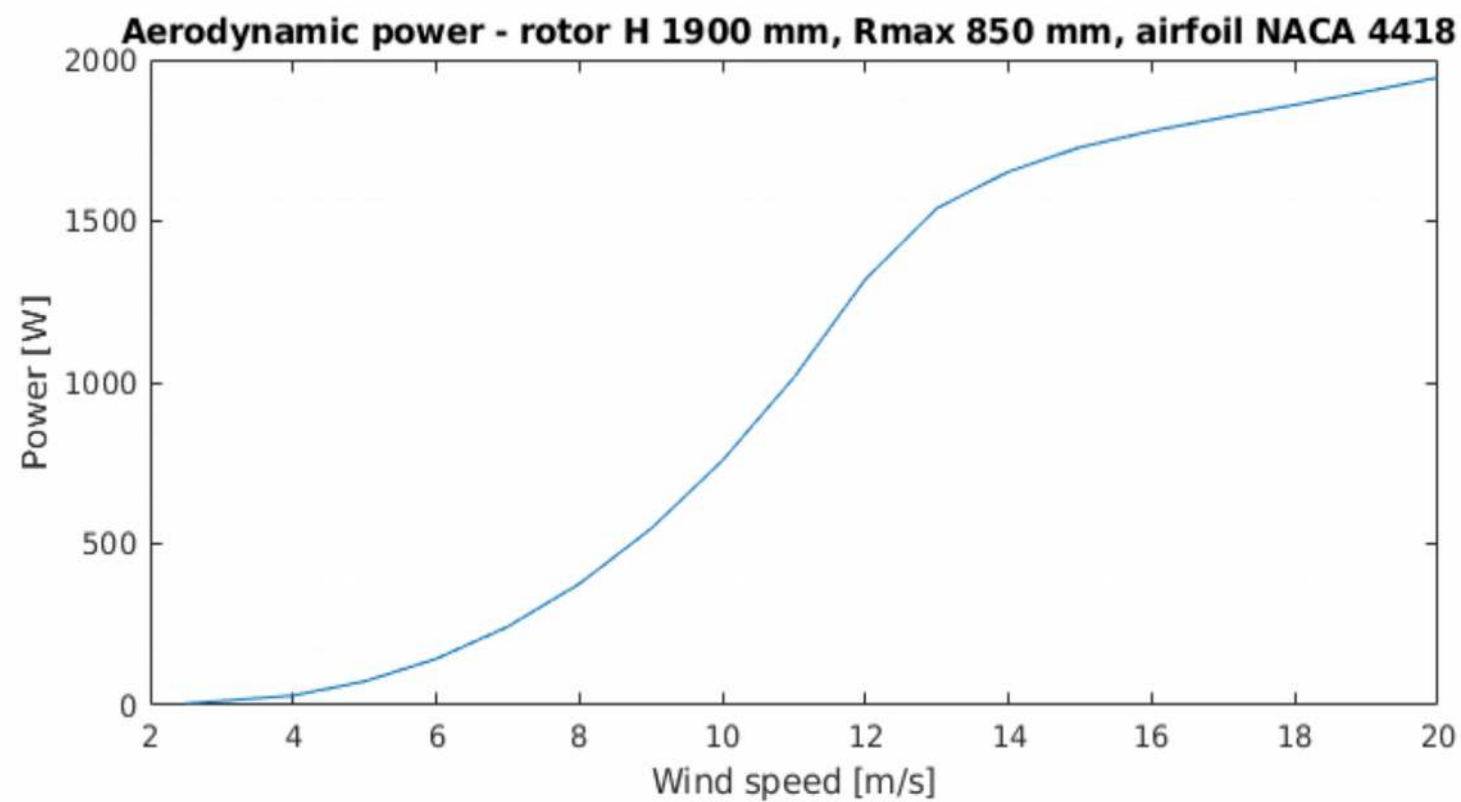
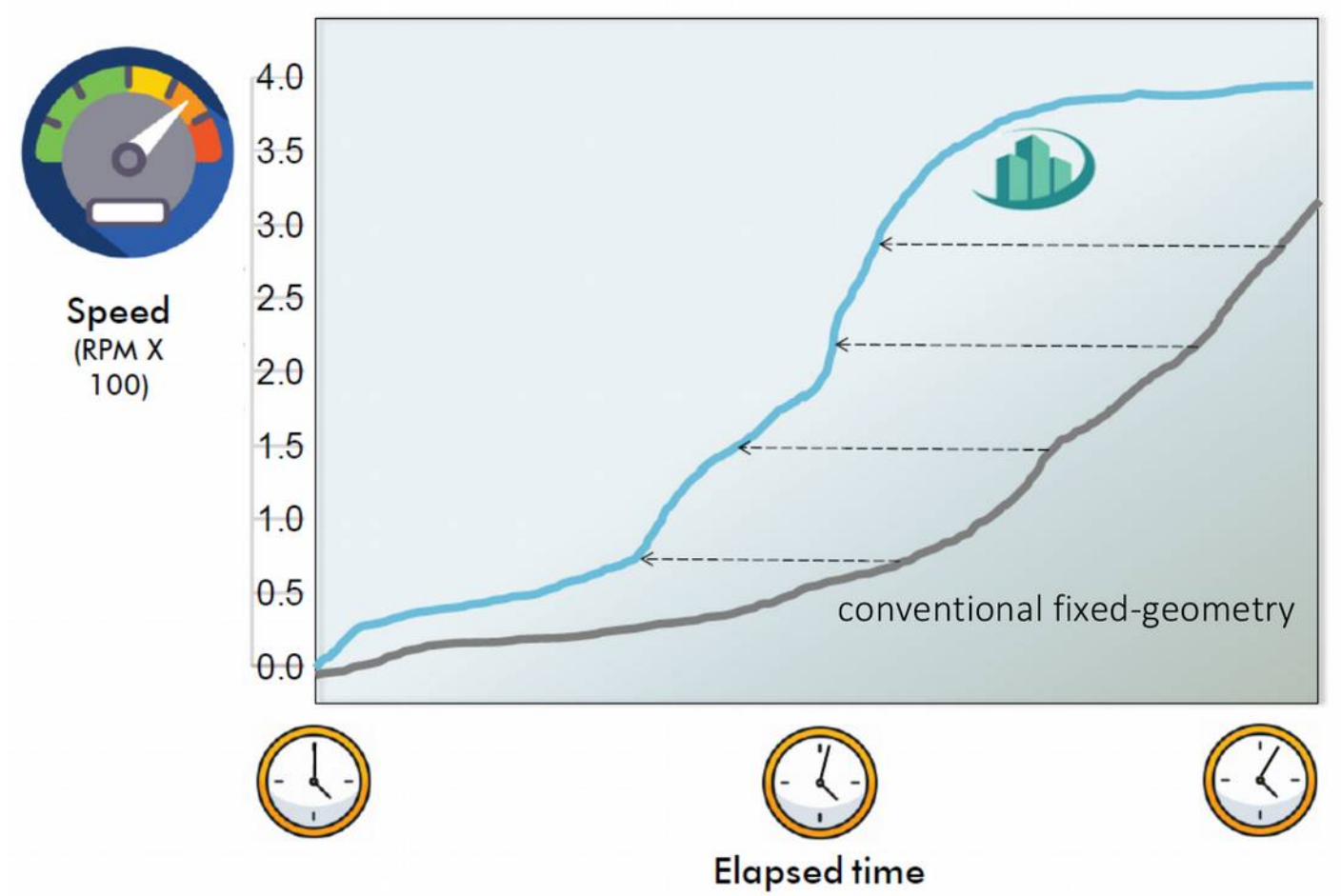
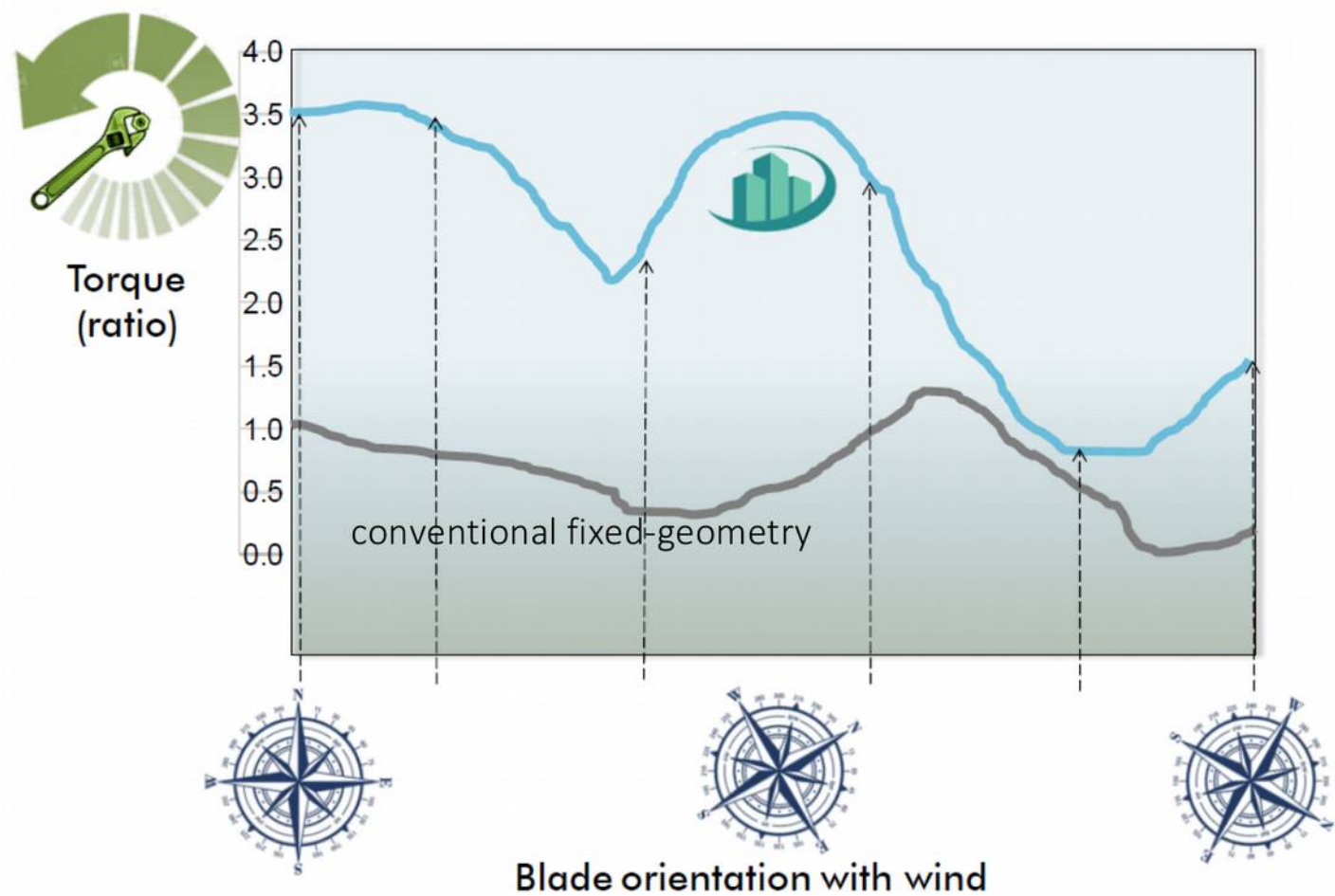
✓ Rotation



TECHNICAL FEATURES

Datasheet

We are a 2006/42/CE Machine Directive compliant company



	Stand-alone pole or low-rise building rooftop configuration	Tower configuration- Medium rise building - Installation integrated TC tower
Dimensions		
Axis	vertical	Vertical
Total Height	10 m	25 m
Tower Height (H)	8 m	as per TC needs
Rotor Width fully-opened (W)	1,8 m to 2,3 m	1,8 m to 2,3 m
Blades Length x Chord	1.900 x 250 mm	1.900 x 250 mm
Weight of:		
Rotor mechanical	45 to 60 kg	45 to 60 kg
Permanent Magnets Generator integrated to Shutdown & Protection System (braking)		
Power Electronics on board		

Materials & Components		
Blades materials	aluminum EN AW 6063, recycled PVC	aluminum EN AW 6063, recycled PVC
Tower materials	S355 steel EN 10025	S355 steel EN 10025
Connecting strut materials	aluminum EN AW 6063	aluminum EN AW 6063
Electricity Generation		
Type of generator	PMG synchronous	PMG synchronous
Type of power converter	diode bridge rectifier boost	diode bridge rectifier boost
Max. Energy producibility	3.300 kWh/y	4.510 kWh/y

Two main configurations can be identified for the deployment of the turbine:

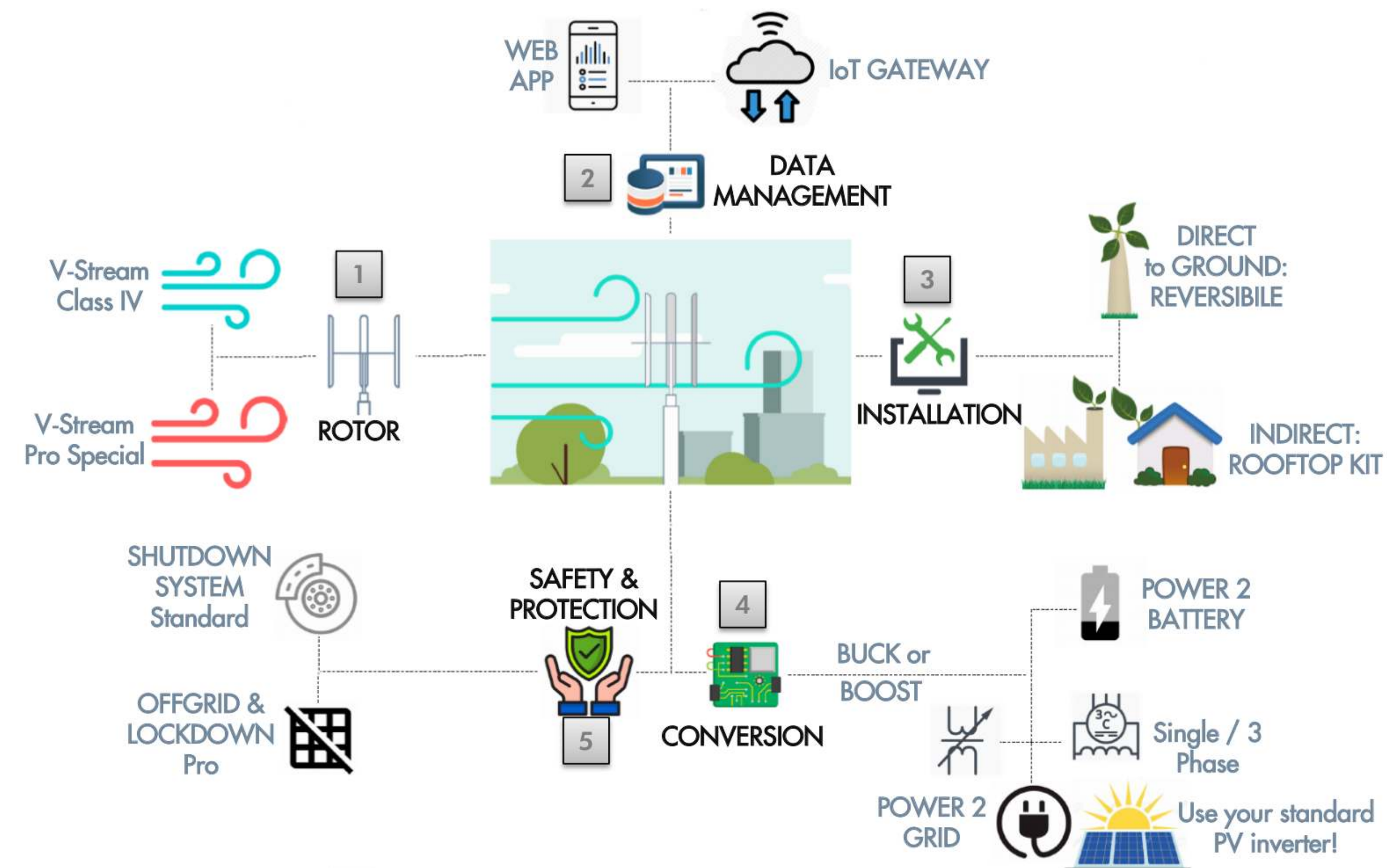
- (1) stand-alone / low-rise building rooftop
- (2) medium-rise / tower

In the latter case we identify a promising use case for industrial energy efficiency e.g. by integration of 1-3 modules in the upper part of 25-30 m telecom towers.

THE ECOSYSTEM OF ADAPTATION **COMPOSE YOUR TURBINE**

Components List

With a Minimum Viable Product pricing



COMPONENTS	VERSIONS	TRL	IRL	MRL	MVP bundle	Add-ons 2021
1. ROTOR with PMG GENERATOR	1.1 V-Stream Class IV 3,6 kWp	85%	75%	80%	✓	
	1.2 V-Stream Class IV 1,5 kWp	85%	75%	80%	✓	
	1.3 V-Stream Pro Special	70%	60%	65%		✓
2. DATA MANAGEMENT	2.1 Web App	80%	80%	80%		✓
	2.2 IoT Gateway	65%	85%	75%		
3. INSTALLATION	3.1 Direct to Ground & Reversible	100%	95%	95%		✓
	3.2 Indirect Rooftop kit	70%	85%	75%		✓
	3.3 Indirect Tower kit	55%	85%	70%		
4. POWER CONVERSION	4.1 Boost: Power to Grid Single-phase	70%	60%	65%	✓	
	4.2 Boost: Power to Grid Three-phase	70%	60%	65%		✓
	4.3 Buck: Power to Battery	65%	65%	65%		
5. SAFETY & PROTECTION	5.1 Standard Shutdown System	85%	75%	80%	✓	✓
	5.2 Pro Offgrid & Lockdown	60%	70%	65%		
Pilot price or [*]					15.000 €	
Series price with 1.1 [*]					9.000 €	

The technical-commercial R&D path towards the delivery of our innovative products to the market is based on the following internal classification:

- TRL Technology Readiness Level
- IRL Industrialization Readiness Level
- MRL Market Readiness Level = 0,5*(TRL + IRL)

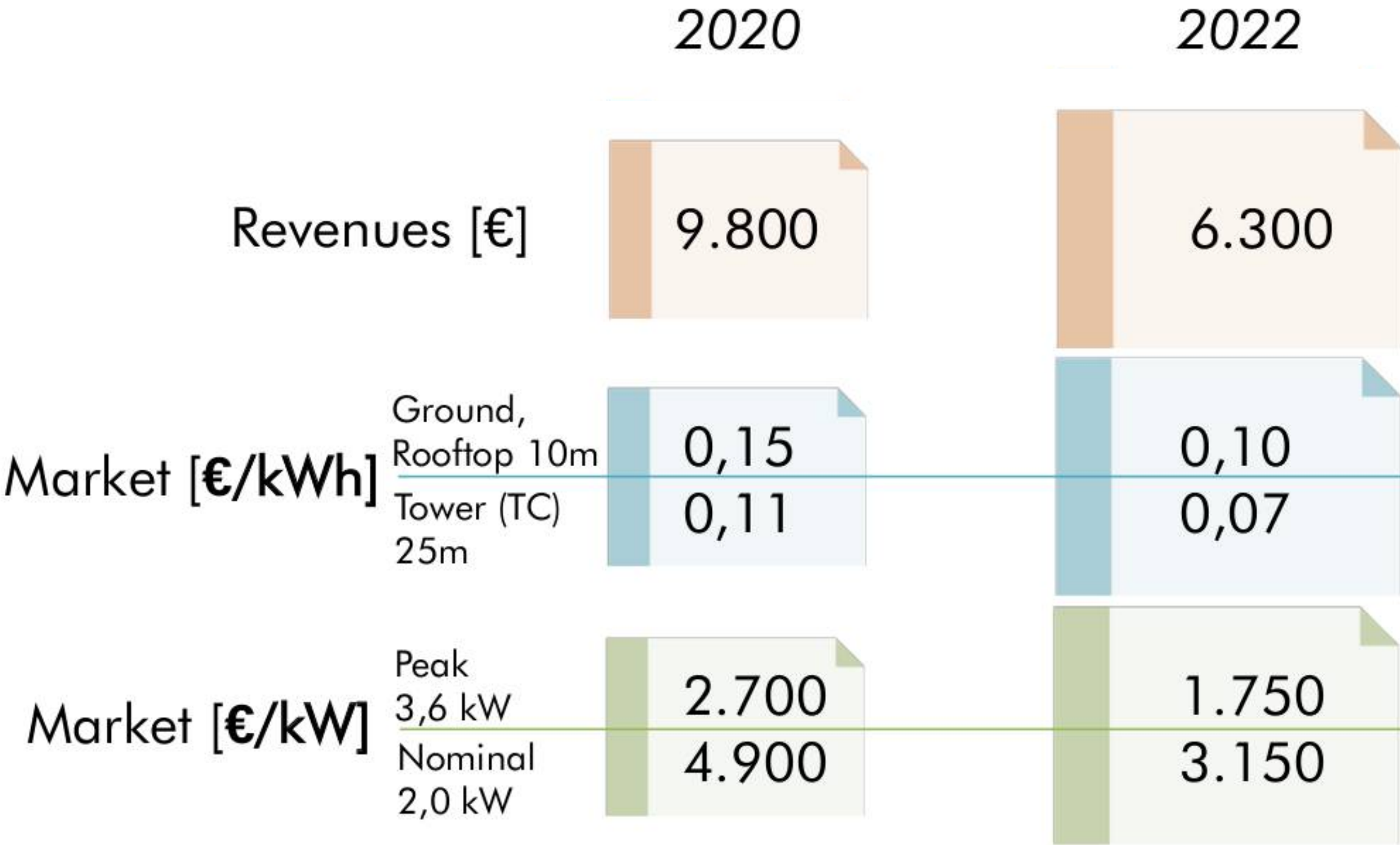
In a totally sustainable and transparent way towards the Early-Adopter Customer as innovation is a permanent status, we classify as Minimum Viable Product deliverable to the B2B Customer for demonstration plants, the MVP components of product that have totaled at least 80% on the MRL readiness scale for market, or at least 80% on the technology readiness TRL scale.

All the components proposed as Add-ons, can grow to the level desired based on specific contracts upon request.

[*] Rent options are available; for 1.2 choice of Rotor Bundle discounts can be configured

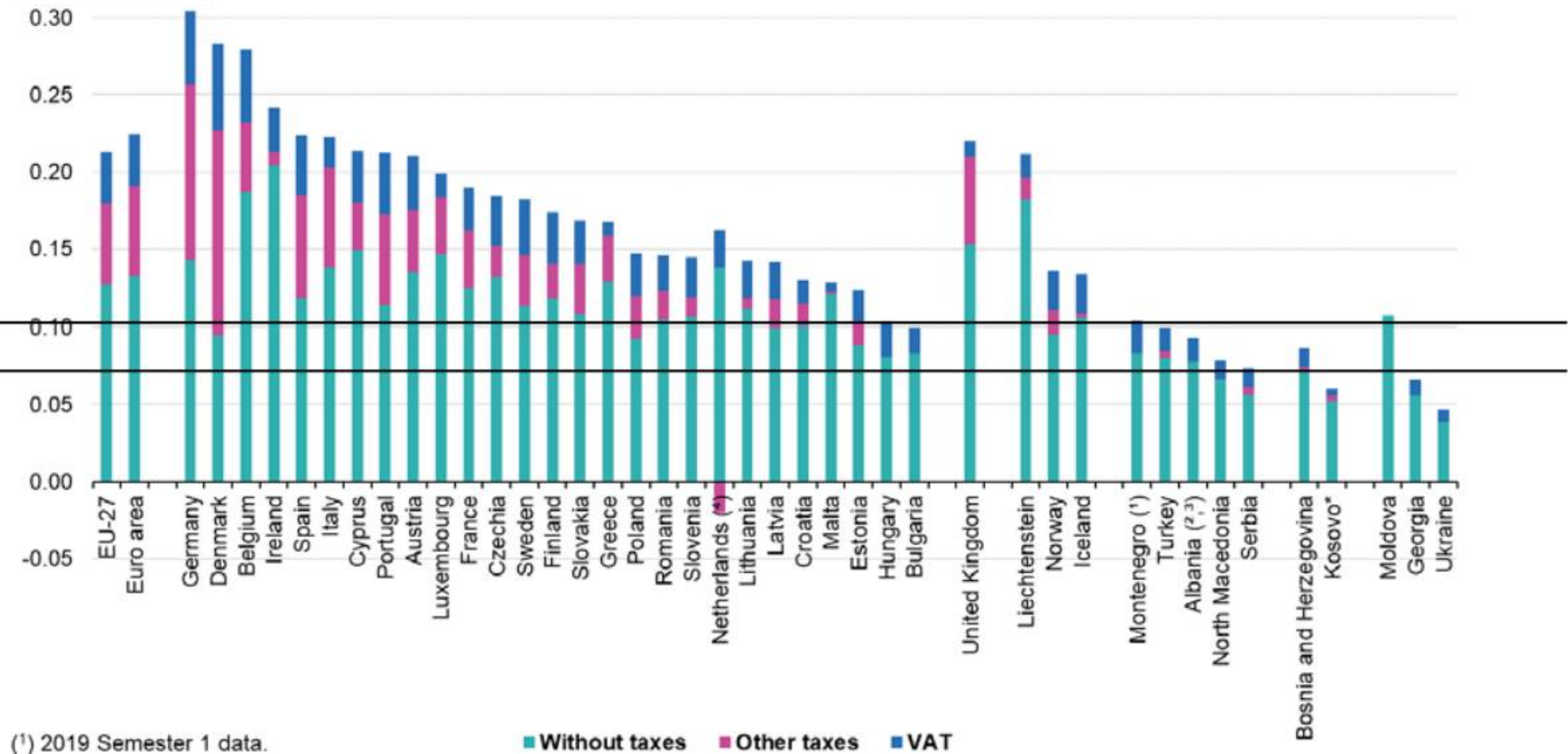
Our Impact Features

Industrialization and Sustainability



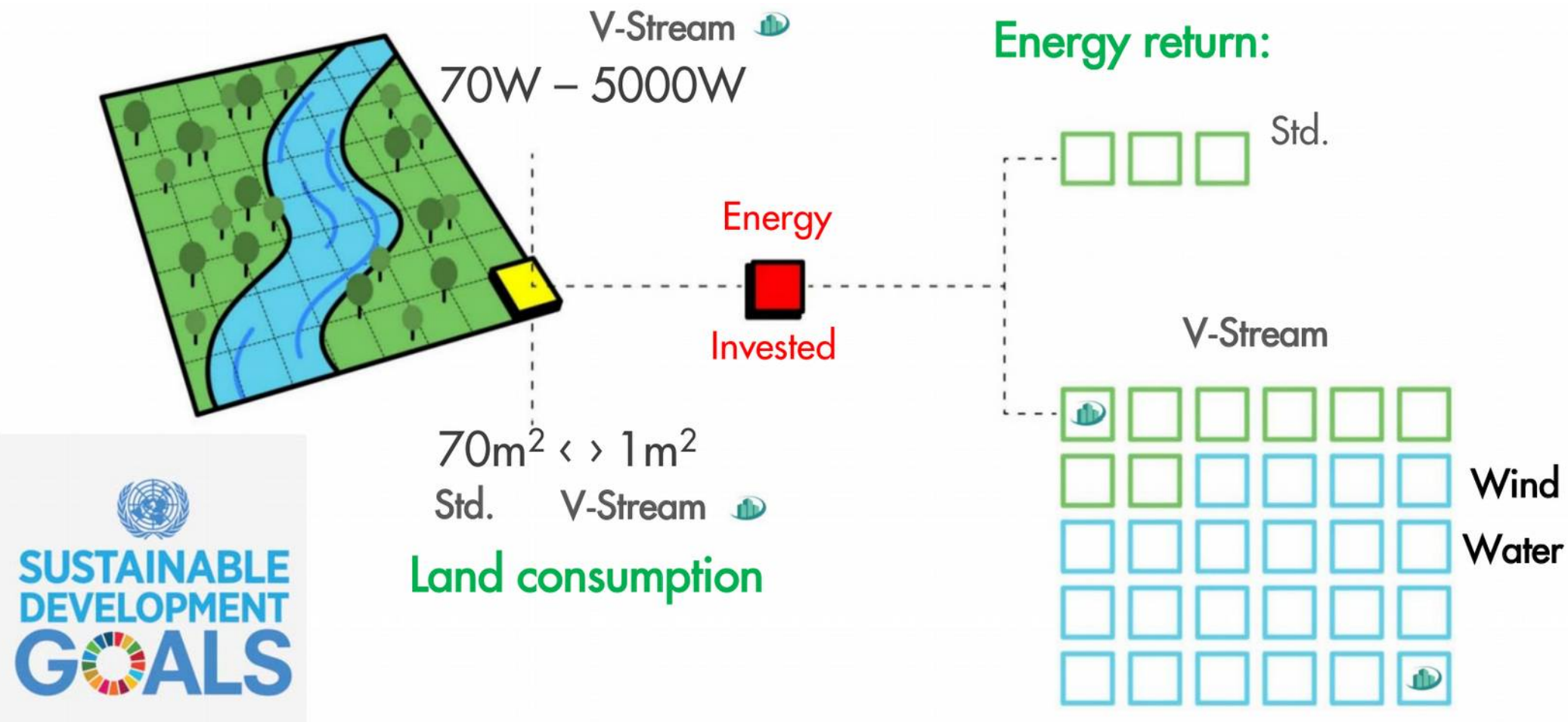
- ✓ The 0,9 M€ industrialization plan will bring the price of energy from 0,15 €/kWh to 0,07 €/kWh
- ✓ The industrialized energy price is sustainable in the market of any of the EU-27 Countries
- ✓ Energy return on Energy invested increases with the use

Electricity prices for household consumers, first half 2020 (EUR per kWh)



(¹) 2019 Semester 1 data.
(²) 2019 Semester 2 data.
(³) estimation.
(⁴) Negative tax is caused by a refund (allowance).
* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence.
Source: Eurostat (online data codes: nrg_pc_204)

eurostat



KNOW
HOW, WHY, WHEN

Know-how & Know-why

The inevitable matching of Technology and Science

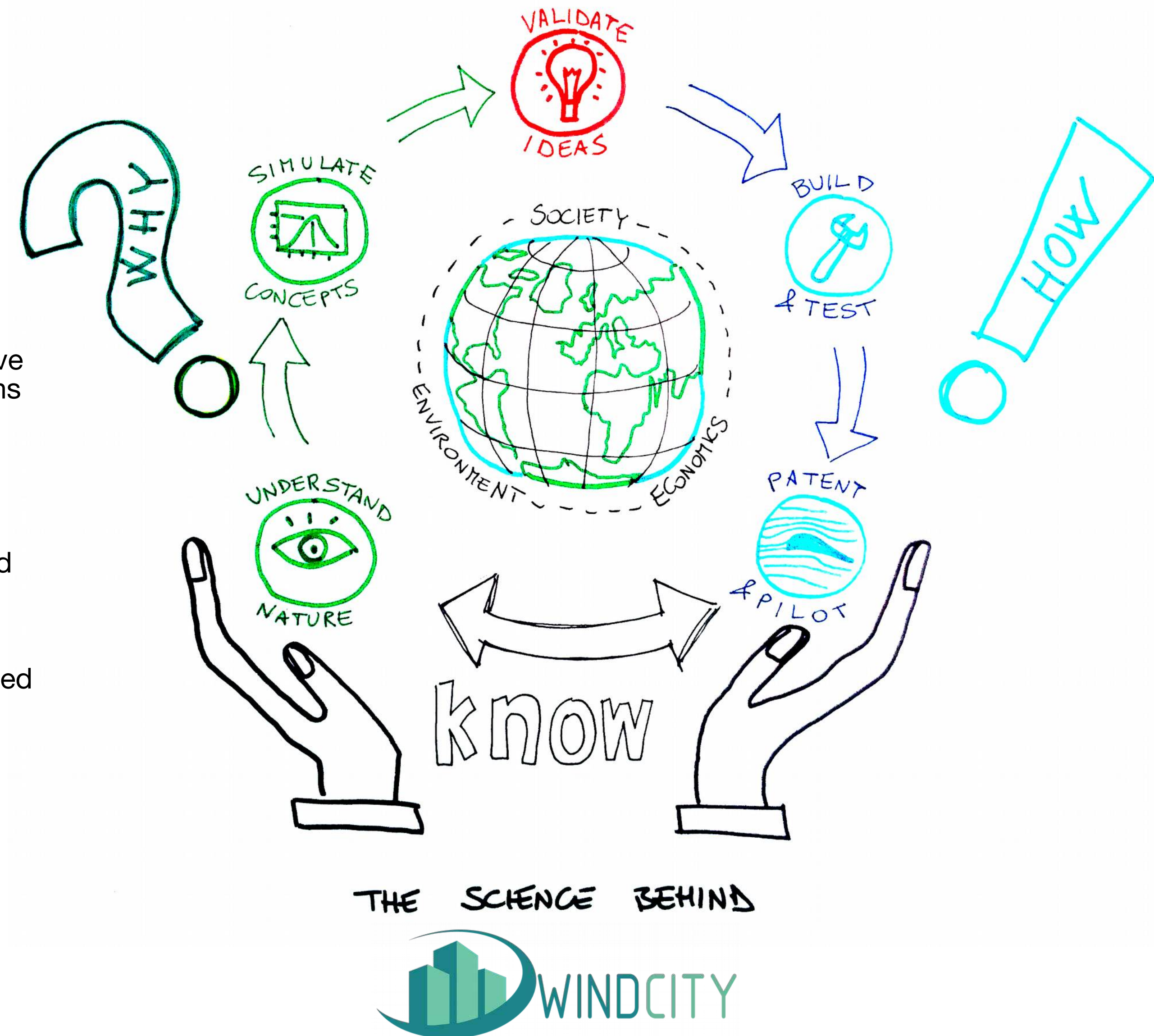
With the development of our new technology, we have accepted the challenge of significantly increasing the efficiency of fluid machines that operate with alternative sources, wind and water, where today the variability of the natural resource weighs heavily on energy production.

More wind energy production near the ground will finally mean offering a realistic alternative to the market of the fossil mix, and this will come at a distributed and local scale.

The “know-how” of a technology cannot be said to be consolidated, if it is not fed by its complement of “know-why”, which corresponds to the most authoritative scientific validation by all stakeholders: Economic, Social and Environmental.

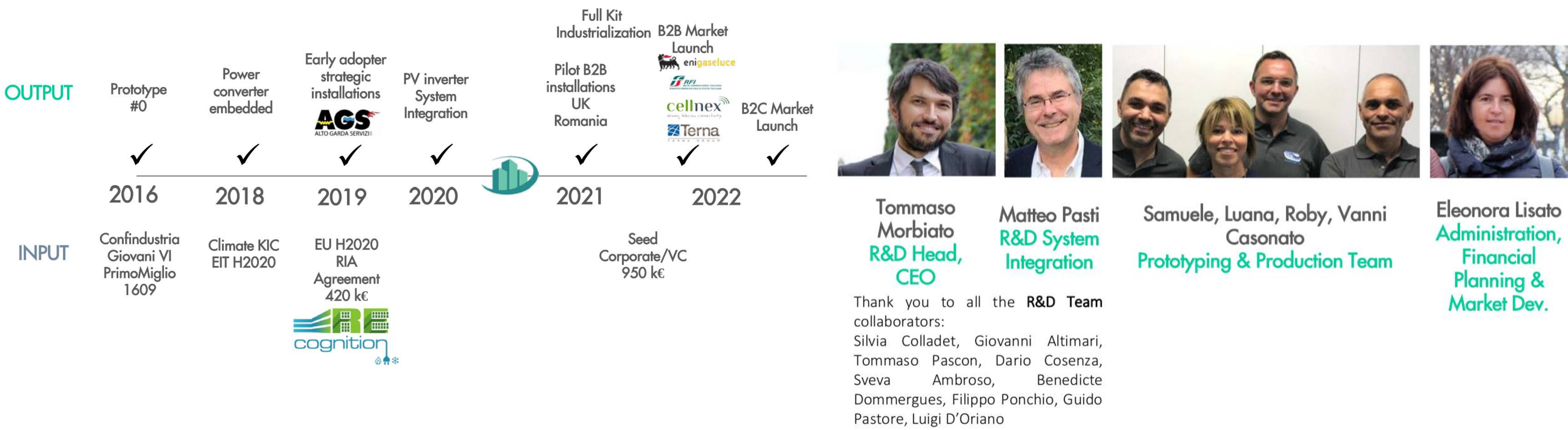
We are a Responsible Research & Innovation (RRI) company and in 2019 we signed a RRI oath within the H2020 Re-Cognition project.

This is how we like to work!



How... we arrive to market

Technology R&D and Market R&D: 2 opposing and integrated souls create the dynamics that bring you forward.



When?

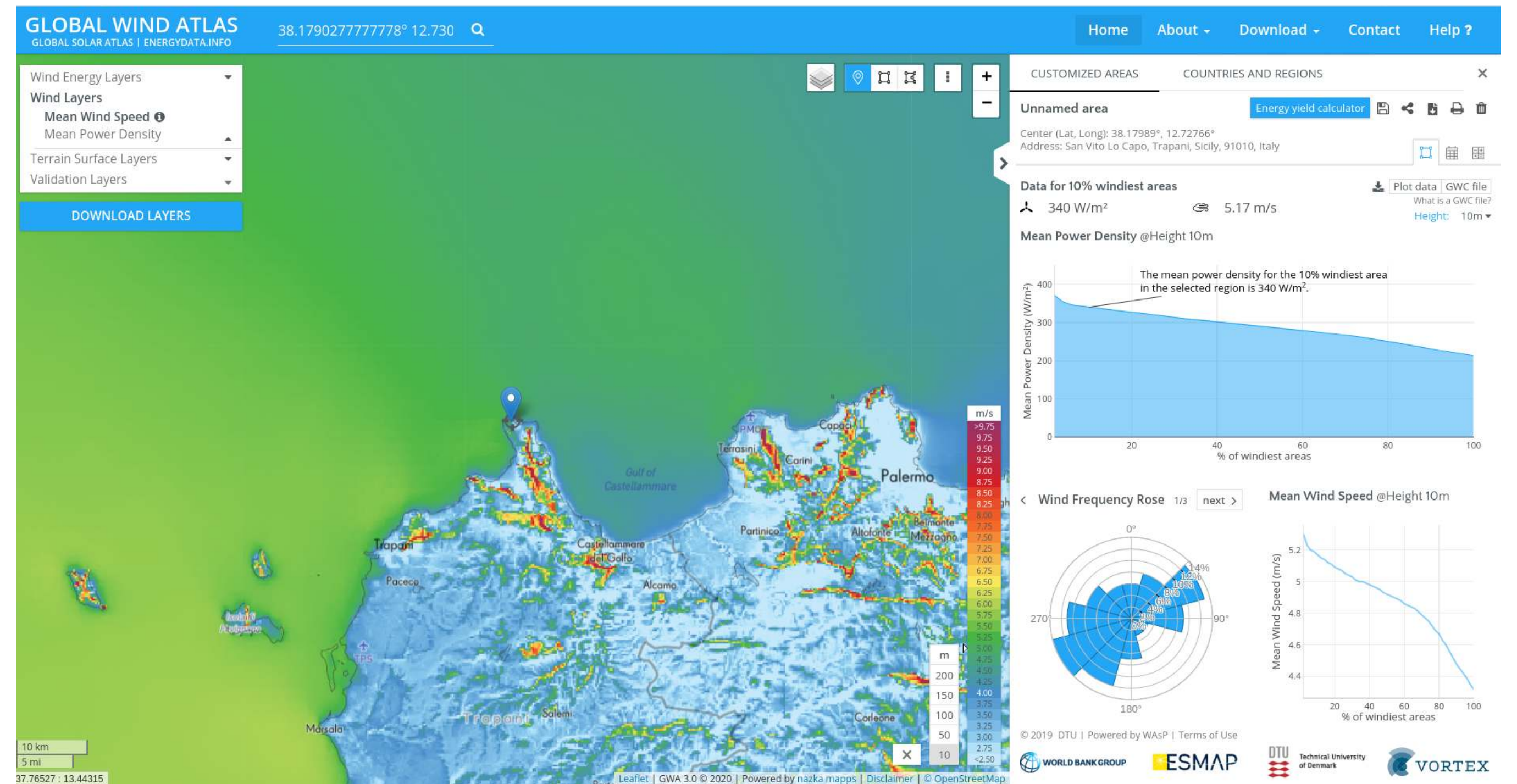
The Big Rise of the Small Wind Market is now!

In 2020, the Global Wind Atlas (GWA 3.0), a product of a partnership between the Technical University of Denmark (DTU Wind Energy) and the World Bank Group released a layer of data at 10 m height from ground, taking into account surface roughness of urban environments. This is a solid evidence of the **global interest** in upcoming opportunities of sustainable businesses in the **small wind distributed generation**.

MarketWatch (News Corp.) forecasts a CAGR **+19,5% for the small wind market**, taking into account the pandemic effects.

1. By now from the first months of 2020, all the information that was missing to plan the generation of wind energy at distributed level is available on a global scale: thanks to this service of the Global Wind Atlas 3.0 **everyone of us, free of charge**, can have an idea of **how much wind** there is even at 10 meters above the ground, **above our roofs all over the Planet**.

2. Wi-fi weather stations now cost less than 100 € and allow you to share your wind data every 10 min free of charge: **we do all the calculations for you free of charge to assess your personal wind farm** prior to take any further decision.



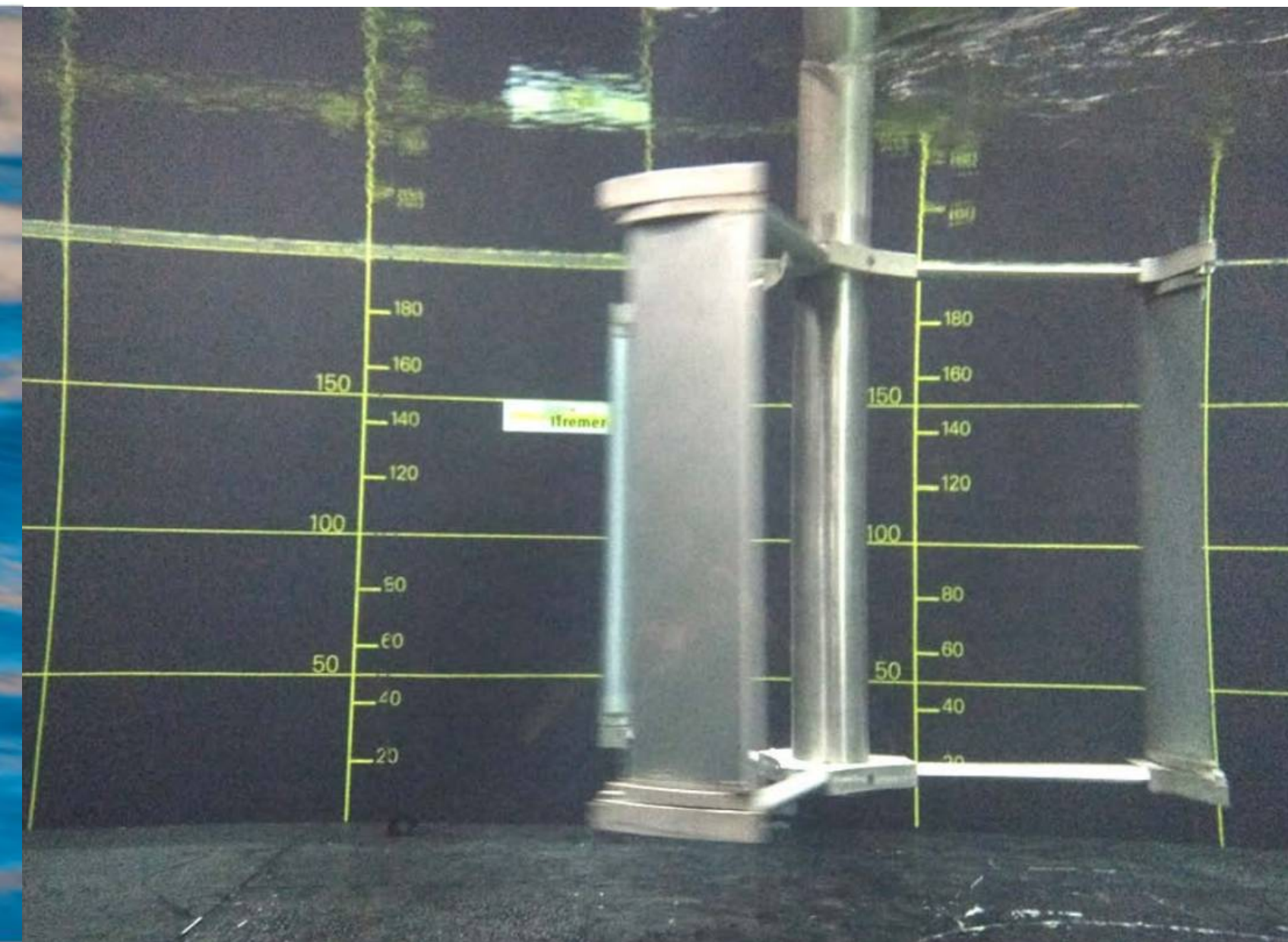
We are not a multinational corporation, we are just an innovative start-up company... nevertheless the European Commission believe in us, and awarded us the Start-up Europe Award 2017, the Seal of Excellence for SMEs 2018, and granted us a Research & Innovation Action since 2019. Yet we are about to enter the market!

The world pandemic Covid-19 tried to block us, but we keep on fighting no matter what: no virus is strong enough to stop the wind forces of Windcity ;)

Be in contact with us: we will do our best to deliver your turbines as soon as possible!

Never stop exploring

Consider Wind & Water: One turbine, two fluids



When are we asking ourselves: why the two fluids together? Could we take advantage of a technology transfer ?
These creatures of Nature tell us about how much there is in common between the world of Air and the world of Water: Reynolds number similitude made self-evident

Aquatic Environment tests: the same Passive Variable Geometry concept in a turbine of similar dimensions can generate up to 10 times more energy going from wind to water variable flows. We develop the technology for the Blue Growth and shared value/licensing opportunities through B2B in the marine operations markets.



KEEP IN TOUCH
BUON VENTO!
www.windcity.it