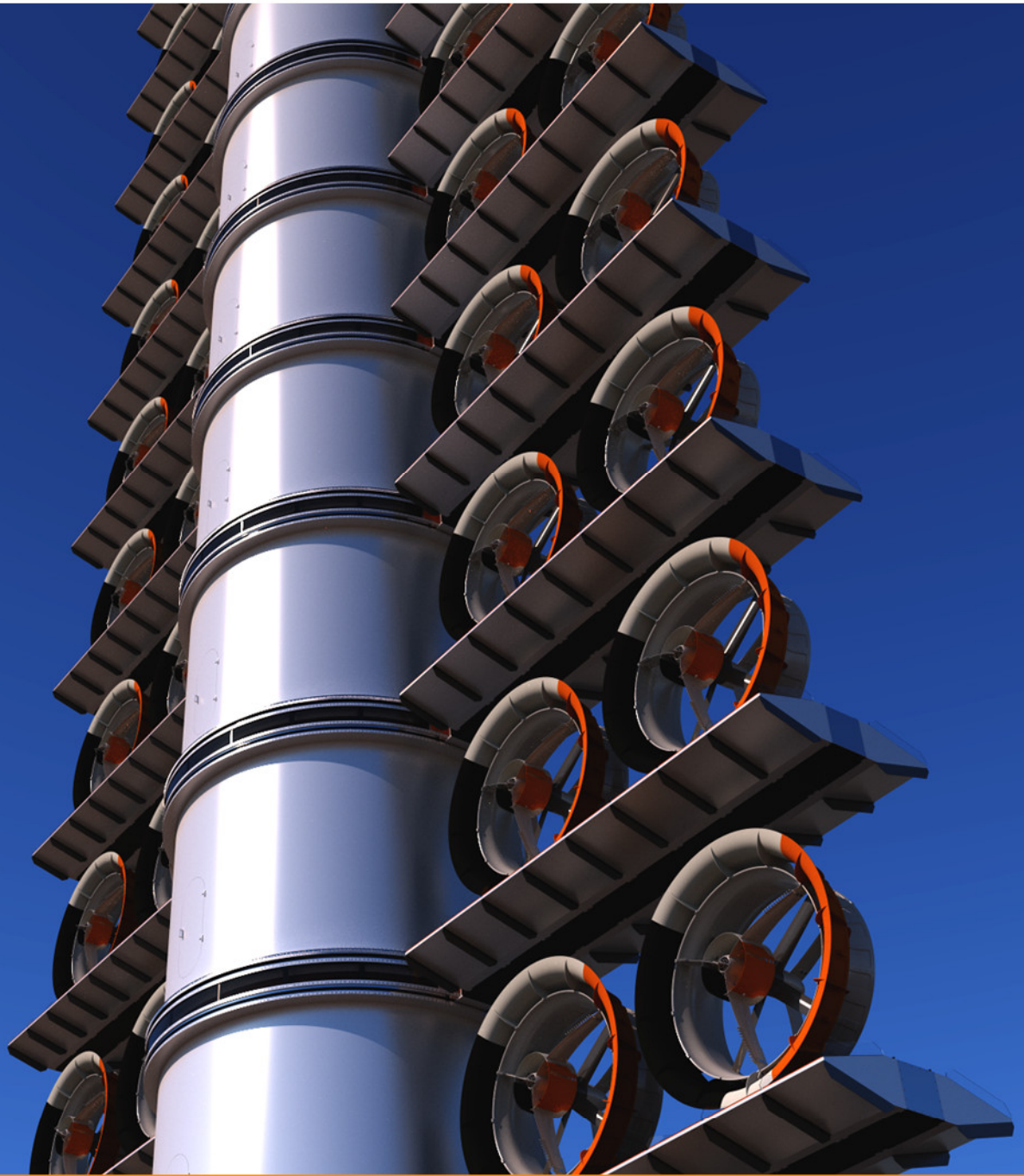


VETROSTUB 1515 9145

NEXT GENERATION IN INDUSTRIAL SCALE WIND ENERGY



All rights reserved © Podunvat Hydrokinetics LTD

Advantages of VETROSTUB technology approach over large conventional wind turbines:

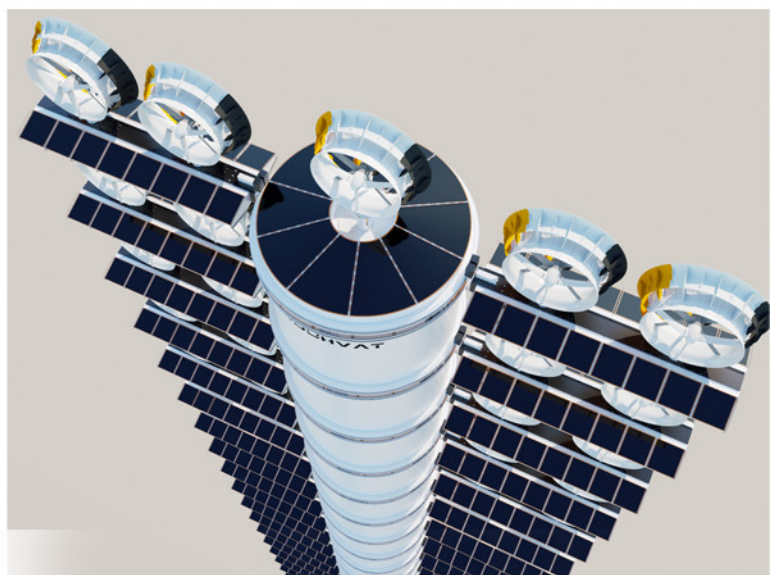
1. Modular power output – power output can be easily configured by simply adding or removing Vetar wind turbines.
2. Higher reliability – multiunit energy output, no gearboxes.
3. Higher productivity relative to rotor area cross section surface size – smaller rotors surface area, but also smaller overall mainframe surface area relative to same power conventional wind turbines.
4. Much easier maintenance – it is much easier to clean and fix small size units than very large ones.
5. Much easier installation of turbines – once mainframe installed, each turbine, weight only 760 kg, can be installed using even the smallest cranes which will simply place turbine on its position.
6. Hybrid technology approach – same technology base can be used for other purposes, like telecommunications (Wi-Fi emitters, cell phone emitters, etc.) and security purposes (radars installations). It can also be upgraded with solar panels.
7. Birds and bats friendly – differently from large wind turbines, which kills millions of birds and bats every year, ducted fast rotating rotors of Vetar 15 wind turbines are very noticeable for birds and bats which makes killing them or injuring them by turbines blades virtually impossible.
8. Significantly reduced vibrations and stress on structure (prolonged life and increased structural resonance resistance) as well as reduced light flickering effect.

VETROSTUB 1515 S145

NEXT GENERATION IN INDUSTRIAL SCALE WIND ENERGY - Technical

Vetrostub have 25 height levels and each of these levels have 360+ deg. horizontal rotation capability. This capability is very important for wind tracking possibility as well as maintenance and safety issues.

Vetrostub never stay idle, even if some of the wind turbines brakes down, other wind turbines and systems remain fully functional. This feature is very important for overall device productivity and investment return.



SOME CHARACTERISTICS OF VETROSTUB

Technical data	
Rated power wind	1515 kW @ 14.5 m/s
Rated power solar per 1 panel	0.18 kW @ 1000 W/m ²
Number of solar panels	805
Rated power solar per 805 panels	145 kW @ 1000 W/m ²
Max power wind	1515 kW @ 14.5 m/s
Max power solar per 1 panel	0.18 kW @ 1000 W/m ²
Max power solar per 805 panels	145 kW @ 1000 W/m ²
Turbine design standard	AWEA, MCS, IEC - 61400-2, Wind class 1
Start-up wind velocity	1.5 m/s
Cut-in wind velocity	3 m/s
Cut-out wind velocity	50 m/s
Survival wind velocity	75 m/s
Wind turbines type	Vetar 15
Rotor diameter	2.5 m
Highest diameter	3.62 m
Number of wind turbines	101
Rated power rotation frequency per rotor	9.6 Hz (576 RPM)
Max power rotation frequency per rotor	9.6 Hz (576 RPM)
Each generator voltage	550 V AC @ 576 RPM
Each generator type	V-GEN 7.5, PM, out-runner
Grid feeding	400 V, 50 Hz, 3 phase 3W or 4W + PE
Turbine controller	ABB Wind Interface 15 kW
Inverter	ABB Trio 20 kW
Yaw Controller	Active
Rotor rotation controller	Active yaw
Breaking system	Resistors braking, Electromagnetic brakes
Remote monitoring	ABB Interface monitoring system, LAN, wireless/GPRS/3G
Interface	Graphic - Display
Designed life span	> 20 Years
Tower	Free standing
Vetar 15 mass	760 kg
Rotating segment mass	7870 kg
Vetrostub tower mass	1212 t
Vetrostub mass (above ground)	1486 t
Vetrostub height	129.6 m
Vetrostub length	23.8 m
Vetrostub depth	7.03 m
Vetrostub tower diameter	6.5 m
Acoustic emission	< 35 dB
Warranty	5 years

