RIAMWIND

Venture company from
Kyushu University

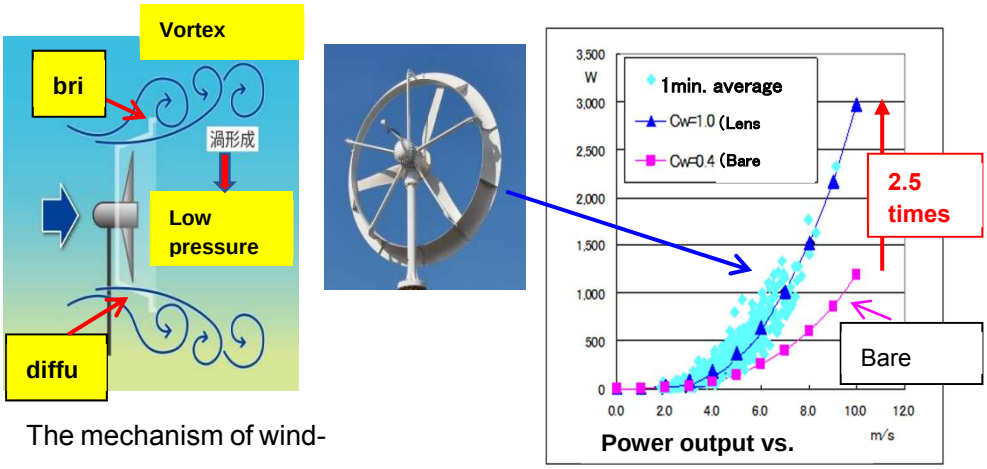
- **Highly efficient wind turbine system**
- **Very quiet**
- **Adaptable to surroundings**

Multi-Lens Turbine

9kW Catalog

Features of Wind-Lens Turbine (WLT) and Multi-Rotor System (MRS)

Highly Efficient WLT: The aerodynamics of brimmed diffuser wind turbines (named "Wind-Lens Turbine", WLT) has been developed. The flow which passes inside the diffuser and the flow which comes around behind the brim generate vortices behind the structure. As a result, a low pressure region behind the turbine is created by the shedding of vortices. Air is thus drawn into the turbine at a higher rate and accelerates more than in the case of a conventional wind turbine (without diffuser). Due to this effect, WLTs show power augmentation by a factor of 2 to 3 compared with conventional turbines.



The mechanism of wind-

Concentration of Wind Energy ("Wind-lens" technology)

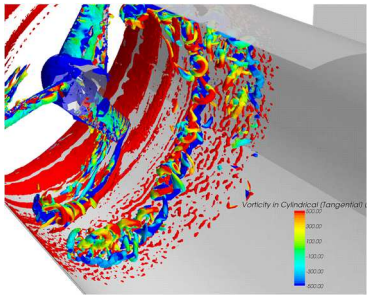
Two-threefold increase in output power compared to conventional wind turbines due to the concentration of wind energy.

Significant reduction in wind turbine noise

The vortices generated from blade tips are considerably suppressed by the interference with the boundary layer within the diffuser shroud.

Beauty

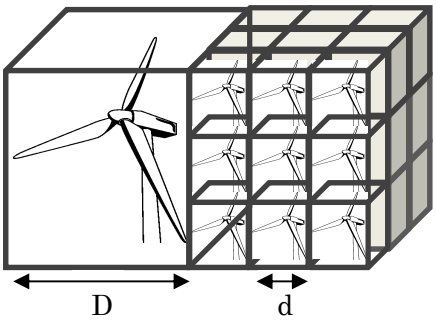
Windlens turbine is quiet, safe and has a beauty that blends into the surrounding landscape



The patent right holder is Kyusyu University (Patentee: Japan, US, China, Applicant: EPO, India)
Riamwind has the exclusive licensee with the right of sublicense

Multi-Rotor System with Wind-Lens

Synergy of Wind-lens technology and Multi-rotor effect



Single turbine and MRS with the same rotor area and the same rated power

Merits

- Weight : 1/√n , n, number of rotors ⇒ great reduction in weight
- Great reduction in cost ⇒ mass production of turbine unit
- If we apply the Wind-Lens turbine to MRS, we can expect 10-20% increase in total power output due to the unique mechanism of Wind-Lens
- Improvement of load factor ⇒ the use of individual power control, if partially down, not the whole system

WL turbine + MRS ⇒ 10%—20% increase in total power output

Breakthrough

Expected Electricity（3kW unit turbine and 9kW multi-lens turbine）

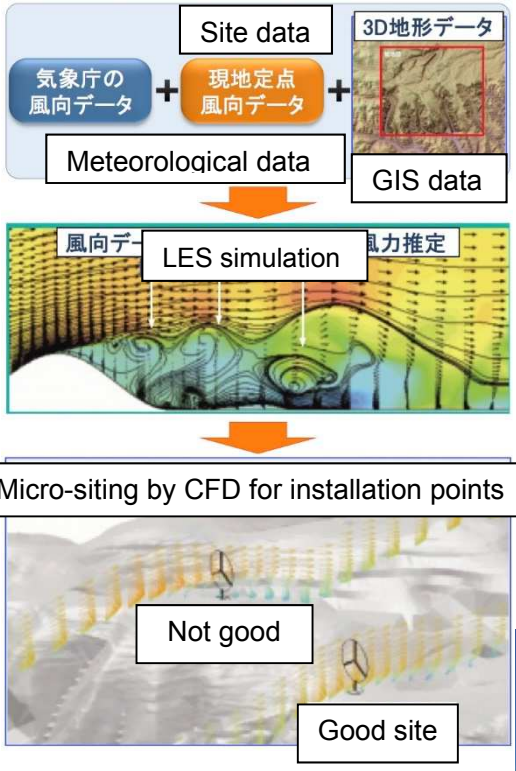
Actual power output strongly depends on the site and wind condition. According to the power curve and the annual averaged wind speed at the site, we can evaluate the amount of annual power output of electricity based on the Wyble distribution.
Considering the availability and the consumption of electricity for the control system, we describe the total predicted power output.（Note：The capacity factor below is based on the field test results obtained by our prototype in Kitakyushu-city from March 2016）

Total power output of electricity for one year (Prediction)

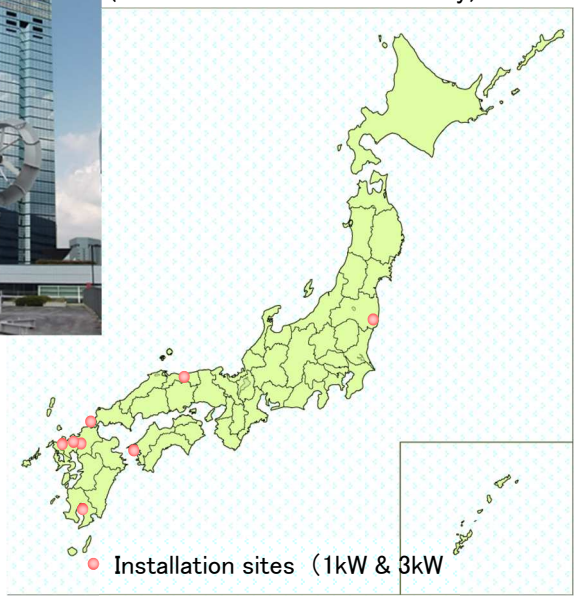
Annual average of wind speed	Capacity factor	RW3K-WA-04	RW9K-M-WA-04
3.0 m/s	4.0%	1,051 kWh	3,153 kWh
4.0 m/s	10.0%	2,670 kWh	7,884 kWh
5.0 m/s	18.0%	4,730 kWh	14,191 kWh
6.0 m/s	25.0%	6,570 kWh	19,710 kWh
7.0 m/s	31.0%	8,149 kWh	24,440 kWh

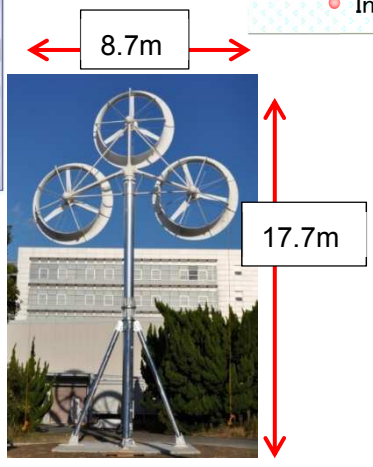
Examples

Prediction of the wind condition and power output



（3kW WL turbine in Fukuoka city）



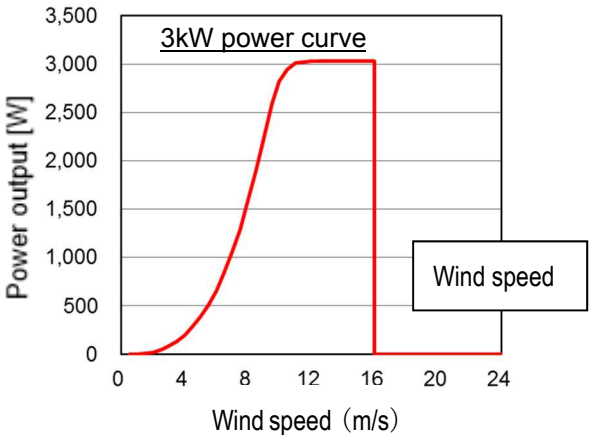


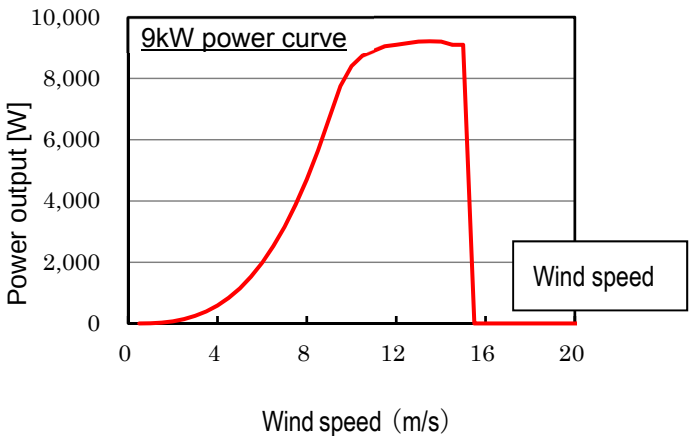
Our company RW has Japanese patent for the MRS with WLT : JP6128575 (21/4/2017) and has made PCT application 2016.

A 9kW multi-lens turbine is under the field test at Hibiki-nada in Kitakyushu-city from March 2017. We are aiming at obtaining the certification of Japanese organization (Class NK) based on IEC-61400-2 by March 2018.

Technical Specifications

No.	Item	Description (RW3K-WA-04)	Description (RW9K-M-WA-04)
1	Rated power output	3 kW	9 kW
2	Rated wind speed	10.5 m/s	10.5 m/s
3	Rotor diameter	2.78m	2.78m (for each unit)
4	Wind-lens diameter	3.64m	8.6m (whole width)
5	Type of wind turbine	Horizontal axis, downwind, shrouded turbine	Horizontal axis, downwind, shrouded turbine
6	Blades	Three blades, fixed angle, CFRP	Three blades, fixed angle, CFRP
7	Generator	Outer-rotor type, Multipolar, Coreless	Outer-rotor type, Multipolar, Coreless
8	Type of yaw system	Passive yaw system	Passive yaw system
9	Brakes	Electric braking, electric stall control	Electric braking, electric stall control, furling
10	Cut-in wind speed	3.0 m/s	3.0 m/s
11	Cut-out wind speed	16 m/s	16 m/s
12	Extreme wind speed	50 m/s	50 m/s
13	Power grid connection output voltage and frequency	Single phase 200 V, 50 Hz / 60 Hz	Single phase 200 V, 50 Hz / 60 Hz
14	SWT class	Designed for class III	Designed for class III
15	Compliance	IEC-61400-2 (JIS-C-1400-2)	IEC-61400-2 (JIS-C-1400-2)
16	Turbine main body weight	440 kg	1290 kg
17	Tower type	Straight tower Option (Hydraulic tilted tower)	Straight tower Truss tower





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