

**TECHNICAL WRITE-UP ON HI-ENERGY  
VERTICAL AXIS WIND TURBINE FOR  
VENTILATION RECOVERY SYSTEM  
(VRS)**

### Foreword:

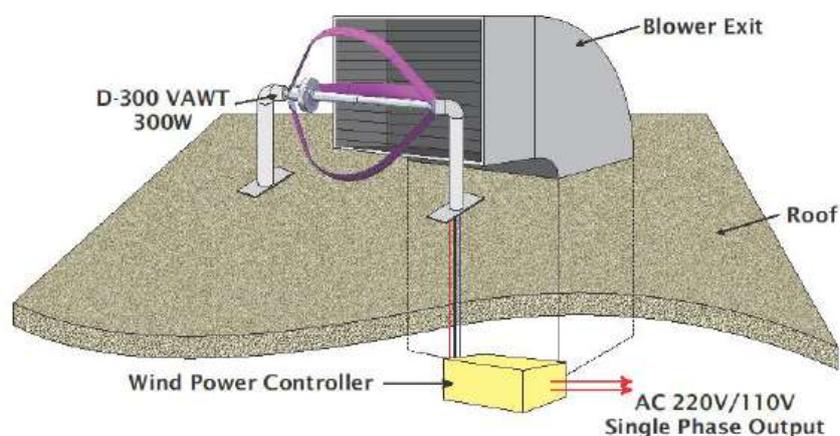
For a wind turbine, wind speed is the most important factor for power output. The best solution is to install the turbine on a site which has strong and constant wind. There is geometric limitation to find an excellent wind speed in natural environment. But it's very easy to find a good and constant wind speed near the exit of ventilation system. By using our coaxial type flow pumping system, we found that the advantage of this ventilation system is not only generating electricity by waste air flow, but improving the smoothness of air flow too. We'll show the specifications of this ventilation system, and show our testing method and results, and briefly estimate the efficiency through these tests.

### Solution of Hi-Energy:

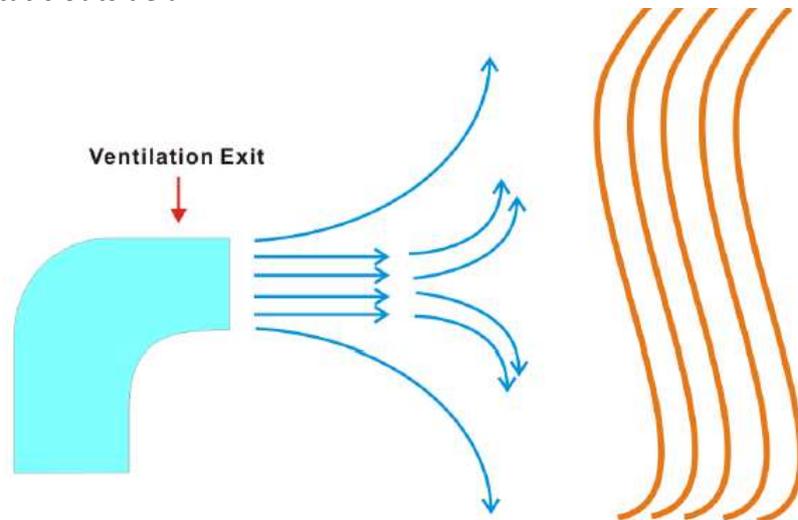
Hi Energy Technology Co., Ltd. as a professional designer and manufacturer of Vertical Axis Wind Turbine deploys the study of this application and finds that proper design of Vertical Axis Wind Turbine operating in different air dynamic flow pattern from Horizontal Axis Wind Turbine, both of the computerized fluid dynamic simulation model and practical test indicate that proper design of Vertical Axis Wind Turbine operating on the outlet of the fan ventilation system do not increase but reduce the air pressure in the outlet of the ventilation fan system. Hi-Energy Vertical Axis Wind Turbine equipped on the outlet of the ventilation fan system achieves both merits of not only generating the recovery wind power but also reducing the fan power consumption. As a result, the continuously strong wind condition as well as restless 24 hours operation in the outlet of the fan ventilation system does create an excellent application for economic wind power recovery by using Hi-Energy wind turbines.

By computer analysing and on-site testing, our ventilation feedback system had successfully achieved the following:

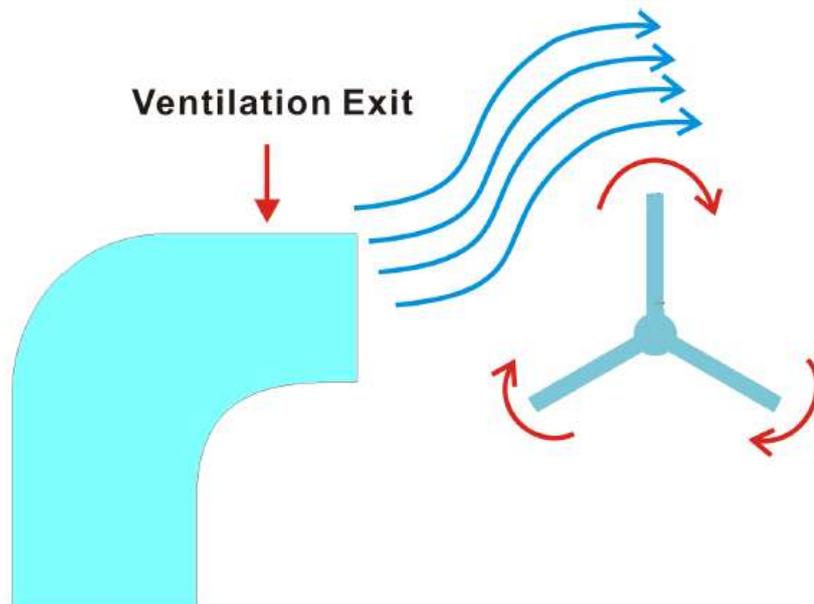
- Recycle the air flow energy back in electricity



- Guide the air flow by the rotation of Darrieus blades. This action will reduce the power consumption of the motor of ventilation blower. Traditionally, the air flow which blow out from the exit of ventilation system will be impeded by the “Air Wall”, which is caused by relatively static outside air.

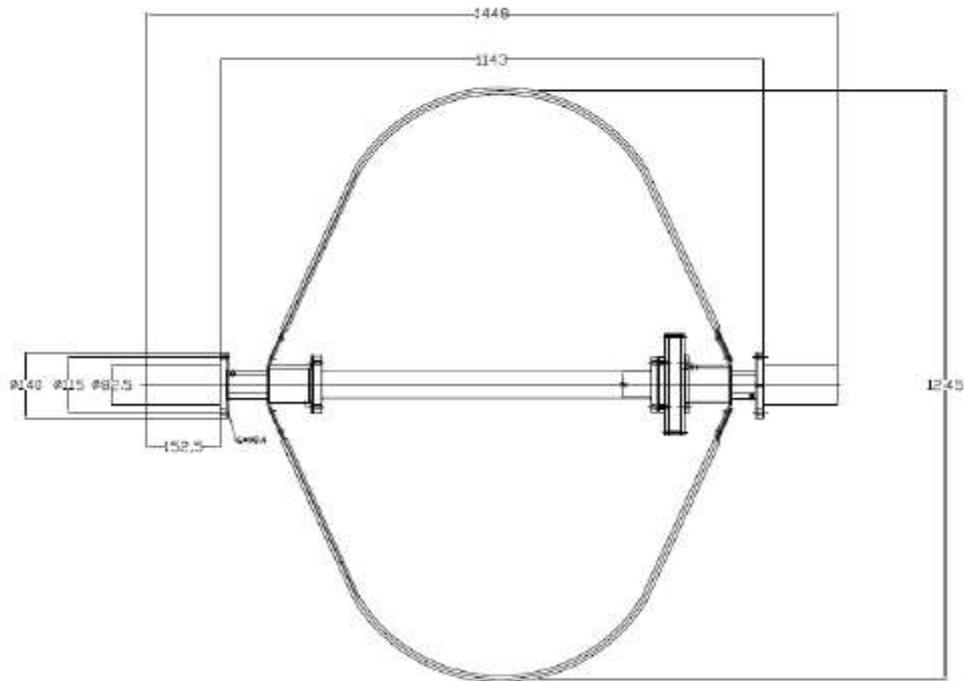


- By leading the air flow through our wind turbine system, the waste air will be exhausted much more smoothly.

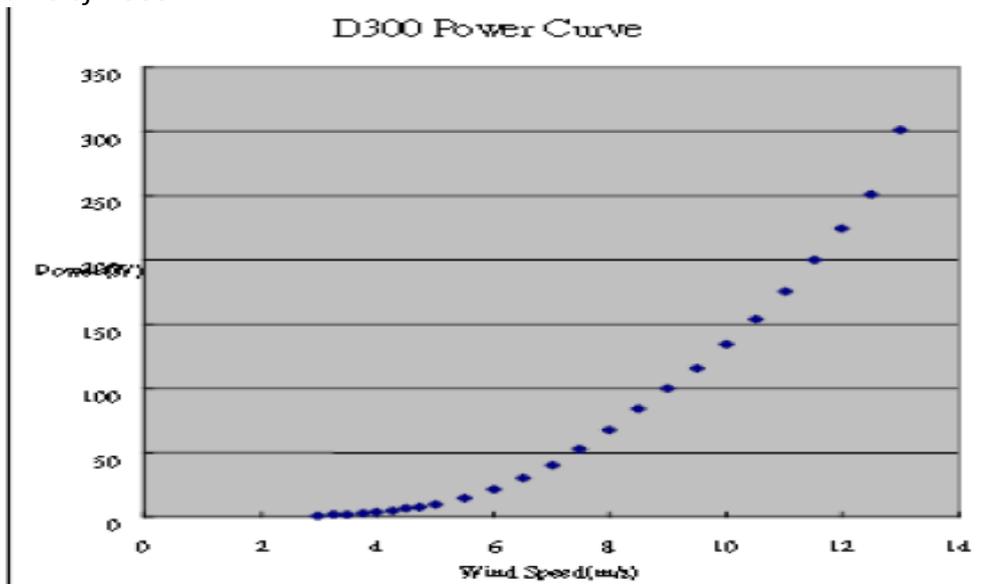


**Technical Information:**

*Diagram of D300 Ventilation System*



*Power Curve of D300*



## Specifications of D300

Generator Specifications	
Generator Type	AC, 3 Phases Synchronism PMG
Rated Power	300W
Inverter System	
MPPT, Over Speed Brake Control, Grid-tied	
Output Voltage (Inverter end)	110~240 V AC Single Phase
Output Current	1~10 Amp
Braking System	
Over Speed Braking Control	Automatic Short-Circuit Braking System
Manual Braking System	Optional
Operation Temperature	
Ambient Temperature	-10~40 °C
Ambient Humidity	95% Maximum

Rotor Specifications	
Blade Diameter	1.245 m
Width (Including flange of damper)	1.143 m
Blade Number	3
Blades Material	Aluminum
Stand Material	SS400
Cut-in Wind Speed	<3 m/s
Rated Wind Speed	12 m/s
Rated Speed	835 rpm
Cut-out Wind Speed	15.5m/s
Survival Wind Speed	60m/s
Weight (Including Stand)	33kg

**Test Method & Results:**

1. Purpose: To prove the efficiency of this ventilation feedback system and to estimate the availability when it is in practical application.
2. Test item:
  - a. Power consumption test in front of exit of blower without any obstacle
  - b. Power consumption & wind generation test of 10cm distance in front of exit of blower
3. Equipment:
  - a. DS300 vertical axis wind turbine without the Savonius rotor
  - b. Blower machine, maximum power output is about 3.7kW
  - c. Inverter
  - d. Anemometer
  - e. Ammeter
4. Test:
  - a. Test 1: Power consumption test in front of blower without any obstacles.

Pictures	Description
	Wire connection for each equipment
	3.7kW fan blower in outlet dimensions of 500*300mm

	<p>Anemometer shows that the wind speed is about 7.5m/s, at the distance of 50cm in front of the exit of blower machine</p>
	<p>Without wind turbine in the outlet, the fan loading is  <math>13.75\text{Amp} * 110\text{V} = 1412.5\text{W}</math></p>

b. Test 2: Distance is 10cm between blower machine exit and nearest Darrieus blade.

Pictures	Description
	<p>Place the DS300 turbine without Savonius rotor in front of the blower machine</p>
	<p>The distance between the exit of the blower machine and the nearest position of Darrieus blade is 10cm</p>

	<p>The wind speed at the position of central axis of wind turbine is about 7.6m/s. The distance between central axis of wind turbine and exit of blower machine is about 70cm</p>
	<p>The power output of wind turbine is 155.6W</p>
	<p>With D300 near the outlet, the fan loading becomes <math>12.65\text{Amp} \times 110\text{V} = 1391.5\text{W}</math></p>

c. Product Test Conclusion:

No.	Description	Comparison Data
1	Fan power loading without wind turbine	1412.5W
2	Fan power loading with D300 near the outlet	1391.5W
3	D300 wind power generation	155.6W
4	Total power saving $[(1)-(2+3)]$	176.6W
5	Power recovery rate $[(4)/(1)]$	12.5%
6	Daily recovered power $[(4) \times 24\text{hrs}]$	4.239kWh

d. Conclusion:

Through these tests, it is obvious that D300 ventilation feedback system does not only have the advantage of electricity generation, but also the reduction of power consumption of blower machine.

**Conclusion:**

There are lots of ventilation system device which distribute on different sites, such as factories, skyscrapers, office buildings, exhibition centers, malls, etc. Most of them operate for 24hrs, and owner can expects the huge expense on the consumption of electricity. Nothing is better than our ventilation feedback system which could save electricity charges, reduce the power consumption, prolong the life of ventilation blower systems and decrease the emission of carbon dioxide. We strongly believe that there is a potential market and sharp growth for this kind of technology, because we're in the right time, we have an innovative and well-developed product, and eager market demands.