

A Project of Wind & Solar Powered Street Lamp



Wind Turbine for hybrid system

1. The hybrid.

The solar panels can only work average 3 hours a day under sunshine. In the raining day and in the night, when solar PV can not work, we can expect the wind turbine.

Compare with the solar (only) street lamp, a hybrid system can reduce the expensive solar PV, and makes the battery charged in most kinds of weather.

2. How much power does an MW-400 wind turbine output?

One important thing of a wind turbine is its cut-in speed. **For example:**

Many wind turbines' cut-in speed is above 3m/s. That means it can output '0' when the wind-speed is below 3m/s.

The cut-in speed of the MW-400 is 2.1m/s as it has low cogging alternator, and 6 blades makes it high torque. If the wind in that area is always 2-3m/s, it also can work and charge the battery. Sometimes it can work hours more than the above.

One characteristic of the MW wind turbine is that it works well at lower wind-speed. The MW-400 can supply 35AH a day to the 24VDC battery bank in the average wind-speed of 5m/s.

3. The weight vs. the installation.

The weight of the wind turbine and the solar PV is important when concerning the intensity and the rigidity of the pole. The MW-200 wind turbine is 8.5 Kg, and the MW-400 is 10 Kg. They are easy to install and light enough.

As the wind turbine can supply more power, the solar PV can be reduced.

The project in Beijing Olympic 2008



In the summer of 2007, Beijing decide to try more renewable power to make a 'Green Olympic'. The plan is to install 8,000 to 10,000 solar powered street lamps in the suburb, near the Great Wall. In the past 3 years, this city has already installed 1,000 to 2,000 such solar powered street lamps. They work 'OK'. But the solar panels have to be 200W or more. And the batteries are always large (300AH above) to storage more power to resist the

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cloudy and rainy weeks.

The problem is that the weather in Beijing is not good enough. So the solar panels and the battery bank have to be big and cost much.

We suggest our hybrid system to the municipality. Our windmill is light enough and easy to install. It even needn't to change the pole of the old kind solar street lamp, just need to weld a short pipe on the top of the pole for windmill to set up.

We get an order of 100 Hybrid powered street lamps for a road near a Village called Cai Jia Wa.



1. Requirement:

- The interval between two lamps is 20M.
- The Luminous flux on the ground can be 6000 Lm.
- The lamp can light 6-8 hours a night.
- The system can work when there is no wind and no sunshine in a period of 72 hours.

2. Designing & Calculating:

Considering the parts in the system:

- a) System voltage rating. *24V is better than 12V as low amp cause lower cooper loss on the wires.*
- b) Lamp. *The brightness of the metal halide lamp can be 85lm/watt. 70W MH lamp can supply 6000 lm. And 70W MH lamp can compare with the 300W incandescent lamp.*
- c) Battery bank. *The 70W/24V lamp will consume $(70/24) * 8\text{hours} = 23.3\text{AH}$ a day. And 70AH for 3 days. A fully charged 200AH battery can supply the lamp for 3 days (8hour a day) even if has no complement.*
- d) Wind turbine. *MW-400-24 can supply 30AH a day in the average 5m/s wind-speed, or 12AH a day in 3m/s.*
- e) Solar PV. *70W solar PV can supply $(70/24) * 3 = 9\text{AH}$ a day in a normal weather.*

Considering the saving:

- a) Power saving. *With the independent power system, not to pay the electricity charge any more. Every HM lamp consumes $70\text{W} * 8\text{hours} * 365\text{days} = 200\text{KW}\cdot\text{h}$ a year. And using the common 300W incandescent lamp will consume $880\text{KW}\cdot\text{h}$ a year.*
- b) CO₂ emission saving. *In a power plant, the energy consumption according to the standard coal is 360 g/KW·h. And 1Kg standard coal can produce 2.6Kg CO₂. So every hybrid street lamp can at least save the CO₂ emission $200*0.36*2.6 = 187$ Kg. This 100 pcs street lamps project can save the CO₂ emission **18.7 Ton** a year.*

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c) Cable. And don't forget the cost saving of the cable and the cable trench.

3. Specification of Wind & Solar Powered Street Lamp in this project:

	Part Name	Parameter
1	MW-400-24 Wind Turbine	400W, 24V
2	Wind charge controller	15A, 24V
3	Solar Panel	70W, 24V
4	Solar charge controller	5A, 24V
5	Inverter	24VDC to 220VAC, 100W
6	MH Lamp with ELE	70W
7	Battery Bank	12V/150AH (2 in series)
8	Pole	8M Long

4. New Project (on test):

We are trying to use LED lamp in the next project.

	Part Name	Parameter
1	MW-400-24 Wind Turbine	400W, 24V
2	Wind charge controller	15A, 24V
3	Solar Panel	70W, 24V
4	Solar charge controller	5A, 24V
5	LED Lamp	50W, 24V
6	Battery Bank	12V/150AH (2 in series)
7	Pole	8M High

Use 50W LED lamp to replace the MH lamp in the old project, advantages:

1. Simpler. As we can choose 24V LED, the inverter is not needed now.
2. Brighter. The brightness of the 50W LED can compare with the 300W or bigger HM lamp.
3. Save the power. The same battery can support longer in the new project.
4. Long life. The LED can work 40,000 hours.