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# *Typhoon Turbines series*

A new source of energy.

Extracting energy from Typhoons and Hurricane
And Tornado and Cyclones.

Potential energy per m2 of a typhoon is unbelievable:
Between 10 and 100 kW.
In normal time it is only approx 60W.
So it is between 150 and 1500 times higher.

In 2012 Hong Kong used 42 000 GWh of electricity/year

With 3 typhoons lasting for 8 days (total)
If we tap 2.2 millions square meters we will generate
The same amount.
We don't even need to store it, since we can send it to
Mainland for direct use and they will send it back later
How much will it cost?
Approx 50 Billions HK$
How much did we pay in 2012 for 42000 GWH?
Approx 42 Billions.

**Question**: Why it has not been done before?
Answer: because there was no machine available
Until now and maybe also nobody tried?
All existing system Wind generators cannot take
This much load.
Microturbines can but it is just by coincidence that
I have decided to verify if it was possible and find out that it is.
I know from the beginning that it could have been possible
But I was thinking that it was not for many Technical reasons.
Today all these technical issues have been solved and
It can be done anytime anywhere.

**Question**: Can the system stand with so much power involved?
Answer: yes it is a lot of power but any building can withstand a typhoon.
A glass window of 5mm thick can withstand.
Even a tree can withstand a typhoon.
Out of 4KW of energy available we only take 200W which
Is only 5%. 95 % of the energy go trough the turbines untouched.
A Building blocks 100% of the energy of a typhoon while we block only 5%.
We must not be too impressed by the energy of a typhoon
It is impressing but manageable.

**Question**: can it be done in stages?
Answer: yes it can.
We can build MW by MW over a period of time.
It can be done at the rate of 5 billions a year over 10 years
For example.

**Question**: Where will it be manufactured?
Answer: some parts are manufactured in Mainland but all the structures and assembling is made in Hong Kong.

**Question**: Who should be involved?
Answer: definitively the power companies CLP & HKE that have the expertise in dealing with high level of energy and maybe some Big Construction company Such as Gammon Construction or New World Construction.
And of course the Government by allocating land.

**Question**: what if there are no Typhoons?
Answer: Unfortunately and maybe fortunately for us the number of typhoon and
Tropical storm is in the increase and their power too.
Even in winter we have quite a lot of very high wind coming from the North.
Anyway we should not rely on Typhoons to manage daily our electricity needs and our Local Power producers have all the infrastructures.
It will help by creating a mix of Coal/Gas/Nuclear/Renewable energy that will be extremely positive.
We may claim that Hong Kong is 100% powered by clean renewable energy.

In fact South China will take advantage of it as there are Quite a large number of typhoons every year from Vietnam to Shanghai.
Philippines could also be very inspired to have such system. They are hit on regular basis by huge Typhoons.

**Question**: who should pay for it?
Actually it is paid by the consumer as we consume the Electricity generated.
It is a commercial operation with high financial return and high image return and maybe the best pollution problem solution.
There is not much risks involved.
It is wind farm that generates power all the year but can also keep working under typhoon wind speed, so the generated power can be doubled or triple in few weeks.
Without it, it may take 10 to 15 years to have a pay back.
With it, it may take only 2 to 3 years.
Investors are very sensitive to that aspect.

***Typhoons /Hurricanes/storms/tempests*** *have a high energy level with winds speed up to 80ms (288 kmh).Their Number is increasing every year (maybe due to climate changes) Until now we just watch hopeless because the energies involved were so great that no machine could survive.*

*This energy can be tapped with Motorwind microturbines. Since 2007 Microturbines have been working under typhoon conditions but the way they were set will not allow generating large amount of power. Today after many tests the solution is coming to the market. Any conventional wind generators have a survival wind speed usually around 16 to 20 ms and must be shut down above this level. Microturbines do not have survival speed due to their low weight and can take very high wind speed.*

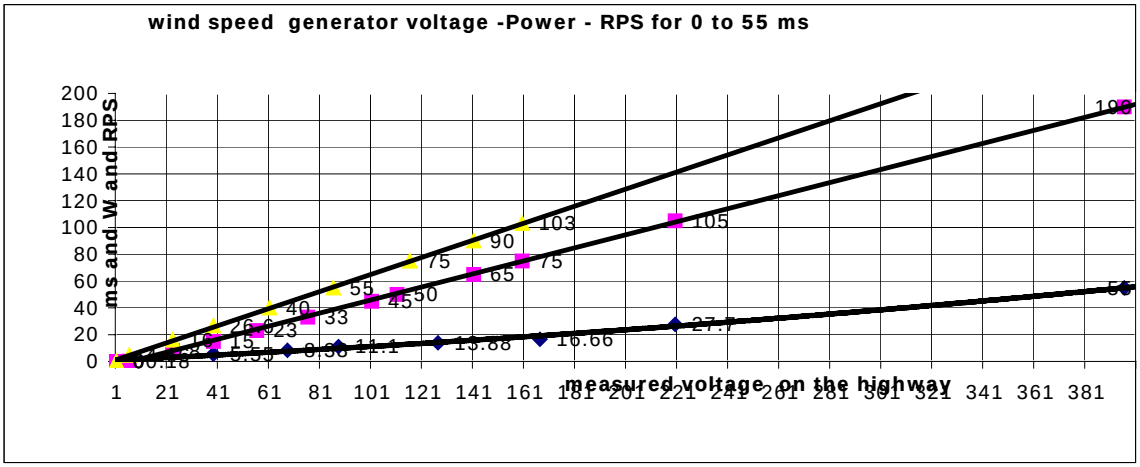
*At 100 kmh –27 ms one single turbine can generate 100 Watts and at 55ms: 190 W.*

*A typhoon wind farm working for only 2 to 3 weeks all around the year can generate tremendous amount of power and still work during more peaceful time even though their production will be not high. In a place with normal wind speed at around 5 to 6ms with a conventional wind generator will generate less energy during the whole year than a Motorwind system during 2 to 3 weeks.*

*One 2MW machine in China with an average wind speed of 6 ms has generated 3.4 GWh in 2010.*

*If we install 100000 Microturbines rated at 19MW we will generate around 6.8 GWh in 3 weeks. Or with an average wind speed of 27ms we will generate 3.6 GWh .The stronger the storm the more we generate.*

**Single unit picture**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## *Specifications for single turbine*

*Power: 200W*
*Voltage: up to 400V DC*
*Max current: 1.4 Amp*
*Rating: 190W at 55 ms*
*Working Range: from 2ms up to 60ms*
*Load: according to wind speed*
*Turbine: 260mm diameter Nylon 66*
*8 blades, 2 SS bearings*
*Generator: 3 Phases PM rectified DC*

*Casing and frame: Stainless Steel 304*

*Weight: 2 Kg.*
*Size: 350 x 260 x 200 mm*

*Designer have been scratching their head very hard to design 2 or 3 or 4 or even 5 MW machines with Motorwind Microturbines we can design 10 ,50,100,200,500 MW systems. The only condition? It can only be installed in typhoons /hurricane areas such as South China Sea /Japan/Philippines /Indonesia/Vietnam/North Europe/South USA/ South Australia/South America.*

*The ideal location is where the average wind speed is 10 to 12ms during Normal days so it can still generate power during Normal weather.*

*At 12/13ms a single turbine can still generate around 20W.*

*A 19KW (100 turbines) installation will generate approx 14 MWH + 6.8MWh during typhoons = 20.8 MWh/year*

*In a non-subsidized country it is 2 years pay back.*

*In a subsidized country it is 6 to 8 month pay back.*

*OF course our low wind speed installation are still of actuality for places that have very low wind speed*

# *Challenges*

***Structures design:*** ***we have experience for the last 8 years in structures design to withstand typhoons forces.***

***Grid availability:*** ***we have been mostly an OFF grid company and we do not have a large experience in downloading such high energy in such short time to the grid so it must be done in connection with the power companies.***

***Safety issues:***

***There is not much issues on the safety aspect as we have demonstrated for 8 years.***

***Why every city should have at least one installation?***

*Because during storms is where we are vulnerable.*
*Power cables are down most of the time and centralized power grid does not give too much flexibility.*
*Usually Power stations are miles away from the city and the power company needs to wait for the storm to stop.*
*With Typhoon turbines during the entire storm there is power available that can be dispatched by the mayor office or utility department.*
*Cities can interconnect with each other to create a parallel grid.*
*If the grid is not affected then the power is downloaded to the grid so they burn less fossil fuel or use the power to recharge electric cars.*

# *Microturbines Technology is modular*

***The installation can be custom made according to any places.***
***It can be as small as 10 turbines up to millions turbines.***

***Rating:*** ***there is no convention in rating at this kind of wind speed so we take 55ms***
***1 single turbine is rated at 190W for 55ms***
***A typhoon wind farm of 1000 turbine is rated at:***
***190 kW***
***A typhoon wind farm of 1 million turbines is rated at :***
***190 MW***

| ***Capacity*** | | ***production*** ***(at full capacity)*** |
|---|---|---|
| ***19 KW*** | ***:*** | ***6.8 MWh/year****(15 days)* |
| ***190KW*** | ***:*** | ***68.4MWh/year*** |
| ***1.9 MW*** | ***:*** | ***684 MWh/year*** |
| ***19MW*** | ***:*** | ***6.8 GWh/year*** |
| ***190MW*** | ***:*** | ***68.4 GWh/year*** |

***While the cost of Turbines + generators is fixed the installation cost depends on different factors***
***Such as structural frames -inverters-batteries-installation-connections.***
***Depending on local regulations each case has to be evaluated.***
***We have estimated that the pay back time could be less than 6/7 years***

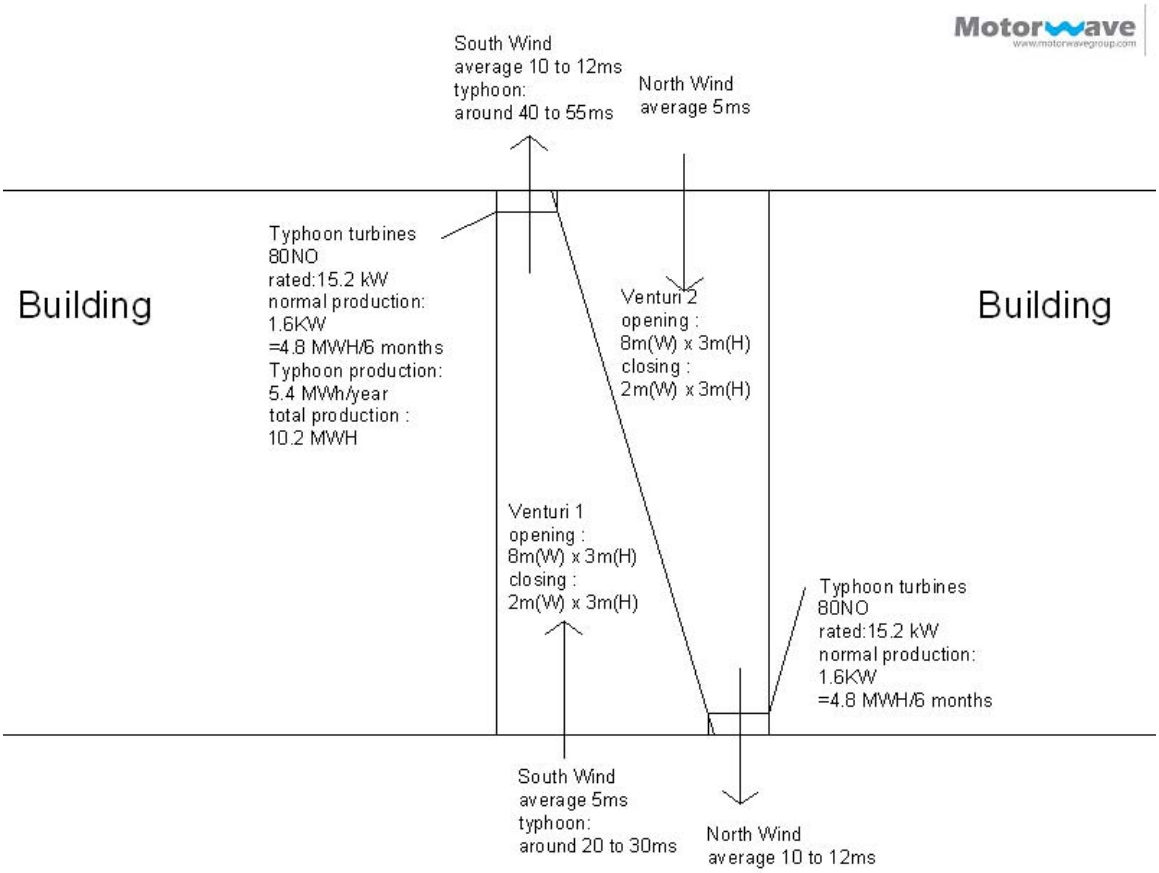
## *Incidence of rain during high wind speed*

Any turbine performance depends on the fluid density.
P ($_{w}$) = ½ A ($_{\text{turb area m2}}$) V^3($_{\text{wind speed}}$) E ($_{\text{efficiency}}$) D ($_{\text{density}}$)

Dry air has less potential energy than wet air and wet air has less than rain.
Density of air is around 1 to 1.2 kg.m3
Rain is around 100 to 500 kg/m3
During typhoon there is period of humid wind and periods
Of rain with heavy wind.
Rain moving at 20ms has more potential energy than dry air moving at 40ms.
We know that Microturbines will work with heavy rain and under high wind speed, but we don't have any data so we can only say that the performances of the Typhoon wind farm will be better than those measured and calculated.

## Consequences in power generation in buildings / housing

If at every floor some space is reserved to install a double Venturi
Then each building can have a significant production.





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