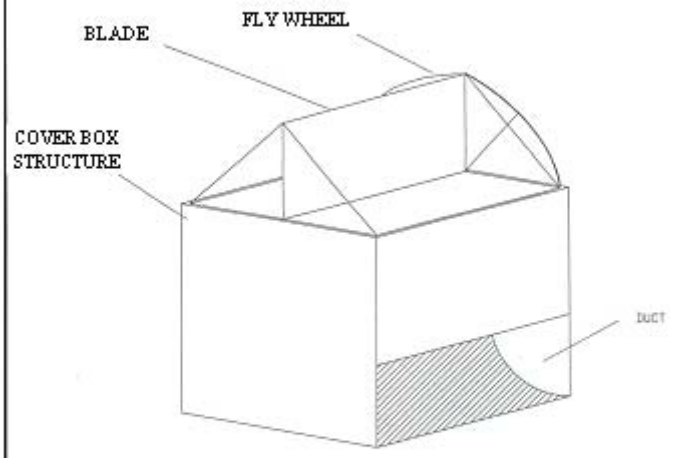
NEW WIND MILL



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CHAPTER1

INTRODUCTION

Power of nature is tremendous. If we can utilize fraction of that power in proper way, it may solve our energy problem completely. Solar, winds are the main non-conventional sources of energies. Solar energy is available everywhere but we cannot tap that energy until now in economical way.

Wind is powerful energy source and can tap it conveniently. There are many wind farms, which harness wind energy and transfer it into electric energy all over the world.

From many years back wind had been utilized by the man to push the ship (having weight in tons) in the ocean and to lift the water from well. When I was in college, I had seen a dream where there was one big windmill with hundred meters length of blades and generating thousand kilowatts of power. But, it was a dream because in conventional windmills, blade length cannot be increased beyond one limit. This is because contact area of blade and shaft is limited. Also surface area of blade is also limited and motion of blade is perpendicular to the motion of wind. Where only fraction of energy get converted into energy. In 1991, I developed the model of windmill where these problems were sorted out.

In this new windmill contact area of blade & shaft increases as width and length of blade increases. Corner of the blade can also be tied with each other to stabilize their deflection. In this case motion of the blade and wind has same direction. So, too much energy can be generated by creating Jumbo type of windmills in costal area where direction of wind is generally stable i.e. from sea to coast or coast to sea.

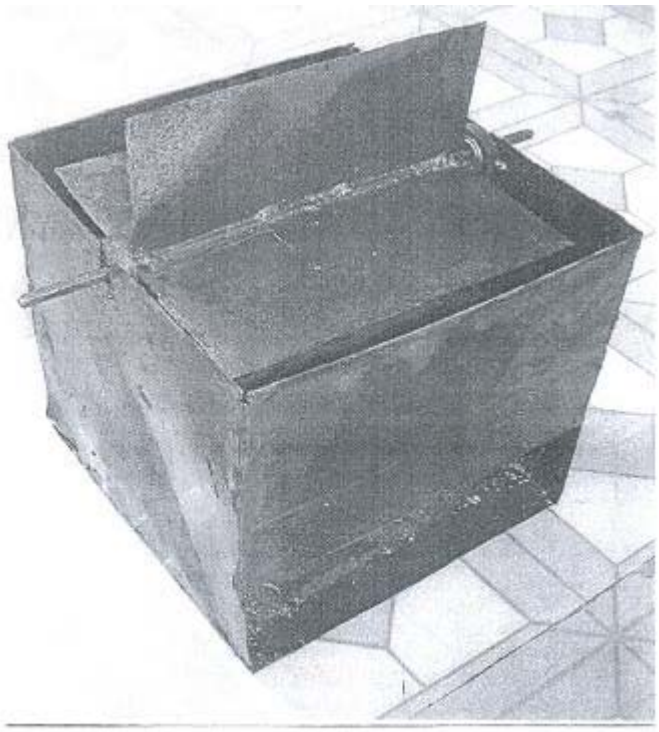
Due to economical constrain, I cannot create the actual model of the windmill & cannot actually test it in wind tunnel or in practical condition. I approach to some government agencies but they have not given me that opportunity. So, now I have developed mathematical model of that windmill and find out how much energy that model will generate by theoretical mathematics. If this model is succeeded in practical platform and become reality then this may become magic machine. All over the world costal area may get crowded with such Jumbo windmills with hundred meters of height and will generate thousand mega watts of energy with out burning any fuel.

One thing must be noted i.e. if wind can push several tons load of ship in ocean then it can run mega windmill also.

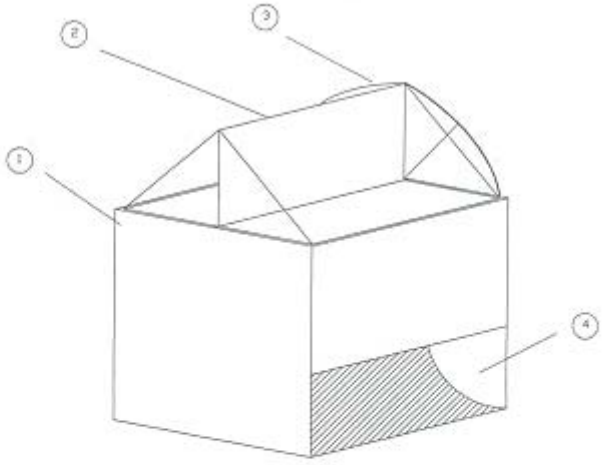
CHAPTER 2

COMPARATIVE STATEMENT

CONVENTIONAL WINDMILL	MY NEW WIND MILL
1) As contact area between blade and shaft is limited. Blade length cannot be increase beyond one limit. So, mega windmill is not possible.	1) Contact area between shaft & blade increases as size of blade increases. Also, blade can be tide with one another. So, mega windmill is possible. (Your windmill may be in genies world record for biggest size.)
2) Direction of wind is perpendicular to motion of blade. So, partial conversion of energy takes place.	2) Direct impact of wind on blade gets converted in to energy & direction of wind is same as direction of blade. So, more energy will be generated.
3) In this windmill generator & blade both are mounted on tower. Blade require special material to make it light weight and strong and generator also must be special.	3) In this windmill, only skeleton is made up of metal or special lightweight material and all surfaces can be created by sailcloth (or lightweight fiber sheet.) and generator can be placed on ground. Special material or any high-tech technology is not required. (The Indian local people of costal area can create even small windmill by using local material.)
4) Cost per unit is more i.e. 3.9 Rs./unit.	4) Cost of construction is less because skeleton is only of metal or special lightweight material. So, cost per unit can be less than 2 Rs./unit
5) Special foreign technology with special research is required.	5) Indian technology can be utilized for construction.



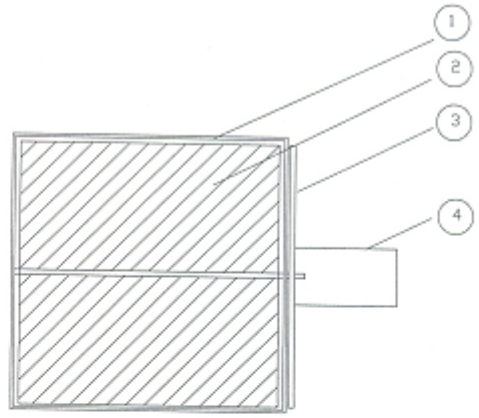
MIMIATURE WINDMILL MODEL



ISOMETRIC VIEW

1. COVER BOX STRUCTURE
2. BLADE
3. FLY WHEEL
4. DUCT

FIGURE 1



TOP VIEW

1. COVER BOX STRUCTURE
2. BLADE
3. FLY WHEEL
4. GENERATOR

FIGURE 2

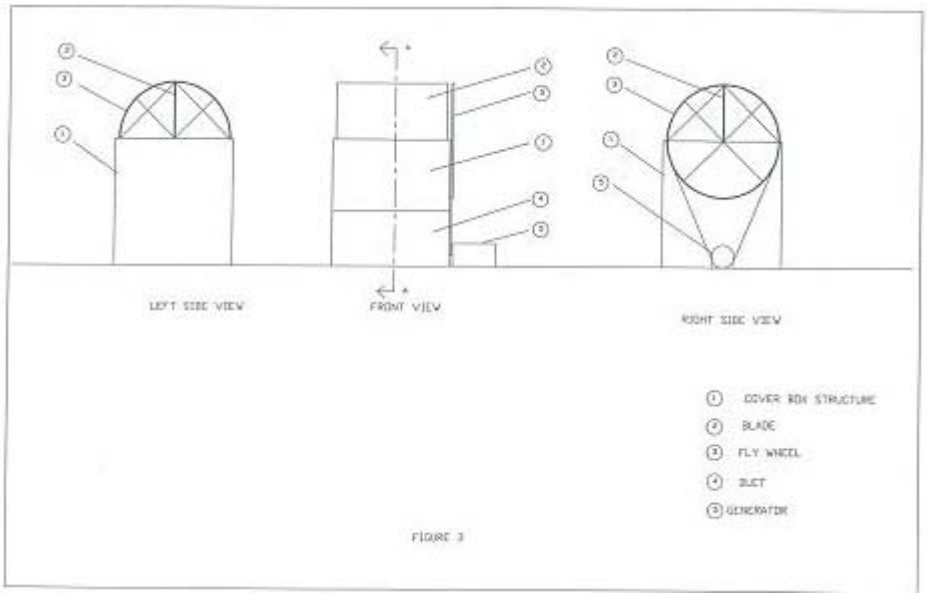
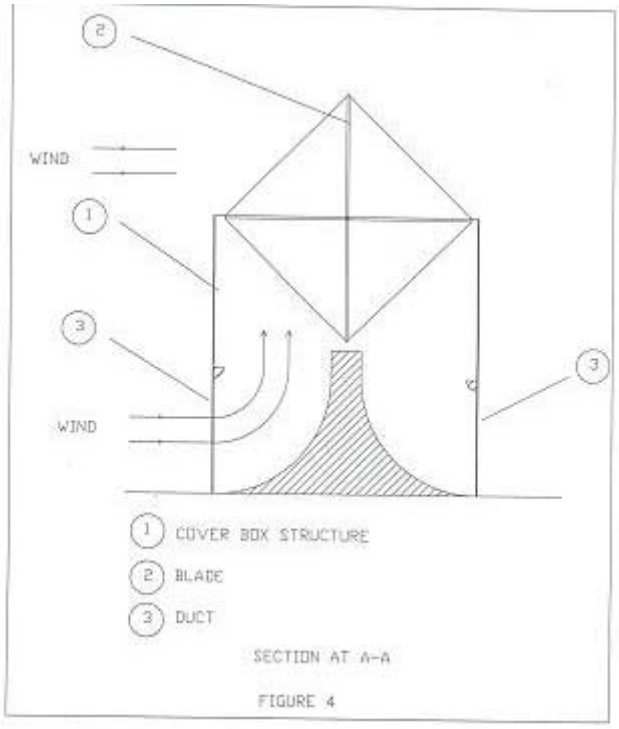

LEFT SIDE VIEW
FRONT VIEW
RIGHT SIDE VIEW
1 COVER BOX STRUCTURE
2 BLADE
3 FLY WHEEL
4 DUCT
5 GENERATOR

FIGURE 3



SECTION AT A-A

FIGURE 4

CHAPTER 3

GEOMETRY OF WINDMILL

In this windmill four blades are mounted on one shaft at right angles with one another and this shaft is fixed at the top of two opposite edges of top open rectangular box. So that in down half portion blades get cover and in top half portion blades are open to face wind of the atmosphere. Also, in bottom portion of box there are two ducts in opposite faces as shown in figure, which again guide the wind towards the horizontal blade to push it up.

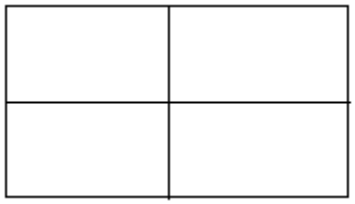
When wind revolve the blade, which are perpendicular to it by direct impact on it. Big pulley attached to it also rotate on which chain is mounted which transfers the torque to series of generators through gear arrangement. Which by auto control keep the rotational speed of windmill as less as possible because that gives more and more power.

Here, important points to be noted are

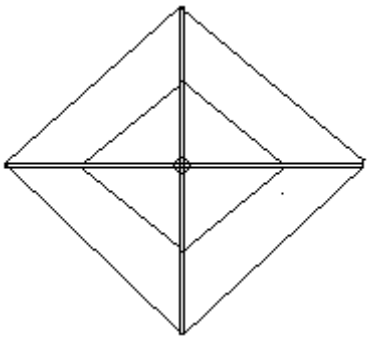
1) Direction of wind should be perpendicular to blade surface to get maximum power. So, this windmill will give optimal results where direction of wind is generally fixed like in costal area.

2) Weight & cost of windmill can be kept less by preparing structure using metal member skeleton (in place of metal member bamboo can be used for small windmills) and gap between these filled by impermeable membrane. (may be of thick cloth)

3) Size of blade can be increased to much by giving additional supportive members other than mainframe to support impermeable membrane in between.



4) For bigger blade two adjacent blades can be tied with each other at edges (as shown in figure) with cable having springs to keep cable in tension always to keep deflection in check.



CHAPTER 3

MATHEMATICAL MODEL

Consider blade motion about shaft.

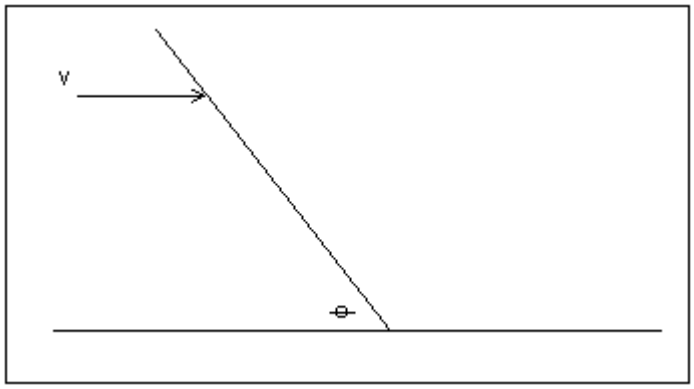


Figure 1.

Let, consider velocity of wind = v m/s

Weight of wind = w N/cum

.g = 9.81 m/s^2

. ω = angular velocity of blade rad/s

R = width of blade

L = length of blade

Consider windmill revolving with constant angular velocity ω & at time when blade makes an angle θ with direction of wind as shown in fig1.

Then, component of velocity perpendicular to blade = v sinθ

Perpendicular relative component of velocity at point 1 at a distance r from axel = (v sinθ - u)

Where u is linear velocity of blade.

So, u = r ω

Here , ω = angular velocity of blade.

So, relative component of velocity $= (v \sin\theta - r\omega)$

Thrust created by wind in small strip area a in this region

$$F = \text{mass} \times (v \sin\theta - r\omega)$$

Here, mass striking per second $= w.a.(v \sin\theta - r\omega)/g$

$$\text{So, } F = w.a.(v \sin\theta - r\omega)^2 / g$$

Here, consider strip width very small i.e. dr

$$\text{. small area } a = dr.\ L$$

$$\text{So, } F = w.dr.L.(v.\sin\theta - r\omega)^2/g$$

$$\therefore\ F = w.dr.L./g.(v^2 \sin^2\theta - 2.v.\sin\theta.r.\omega + r^2\omega^2)$$

$\therefore$ Work done per second $= F \times u$

where $u = r.\omega$

$\therefore$ Work done per second $= w.dr.L./g.(v^2.\sin^2\theta - 2.v.\sin\theta.r.\omega. + r^2\omega^2).r.\omega$

$$\text{power} = w.dr.L.v^2.\sin^2\theta.r.\omega/g - w.dr.L.2.v.\sin\theta.r^2\omega^2/g + w.dr.L.r^3\omega^3/g$$

$$= w.L.\omega.v^2.\sin^2\theta.r.dr/g - 2.v.w.L\,\omega^2.dr.\sin\theta.r^2/g + w.L.\omega^3.dr.r^3/g$$

here, w, L, ω, g & v are constants.

$$A = w.L.\omega.v^2/g$$

$$B = 2.v.w.L\,\omega^2/g$$

$$C = w.L.\omega^3/g$$

So, Work done per second $= A.\sin^2\theta.r.dr - B.\sin\theta.r^2.dr + C.r^3.dr$

$\therefore$ total work done per second for complete blade

$$= \int_0^R A.\sin^2\theta.r.dr - \int_0^R B.\sin\theta.r^2.dr + \int_0^R C.r^3.dr$$

$$= A.\sin^2\theta.R^2/2 - B.\sin\theta.R^3/3 + C.R^4/4$$

Let's for angular displacement = $d\theta$

Time required is dt

Then, $\omega = d\theta/dt$ $\quad\therefore\quad d\theta = \omega \, . \, dt$

In time dt, work by force F

= work done /second x dt

$=[(A \, .R^2 /2) \sin^2\theta - (B.R^3 /3) \sin\theta + (C \, . \, R^4 /4)].dt$

But, $dt = d\theta/ \omega$

$\therefore$ Work done in time dt & angular displacement $d\theta$

$=[(A \, .R^2 /2. \omega) \sin^2\theta - (B.R^3 /3. \omega) \sin\theta + (C \, . \, R^4 /4. \omega)].d\theta$

Work done when blade of windmill moves through 0 to $\pi/2$

$$=[(A \, .R^2 /2. \omega) \int_0^{\pi/2} \sin^2\theta \, d\theta - (B.R^3 /3. \omega) \int_0^{\pi/2} \sin\theta \, d\theta + (C \, . \, R^4 /4. \omega)] \int_0^{\pi/2} d\theta$$

$=[(A \, .R^2 /2. \omega). \pi/4 - (B.R^3 /3. \omega). 1 + (C \, . \, R^4 /4. \omega)]. \pi/2$

after putting values of A, B and C

$=[(w.L. \omega.v^2/_g \, .R^2/_{2. \omega}). \pi/_4 - (2.v.w.L \, \omega^2/_g.R^3/_{3. \omega}). 1 + (w.L. \omega^3/_g. R^4/_{4. \omega})]. \pi/_2$

$= w.L.R^2/g \, [\pi/8.(v^2 + R^2. \omega^2) - 2/3.R.v. \omega]$

$= w.L.R^2/g \, [\pi/8.(v^2 + R^2. \omega^2) - 2/3.R.v. \omega]$

$= w.L.R^2\pi/_{8g} \, [v^2 + R^2. \omega^2 - 2x8/_{3\pi}.R.v. \omega]$

$= w.L.R^2\pi/_{8g} \, [v^2 + R^2. \omega^2 - 56/_{33}.R.v. \omega]$

As angle between two blade is $\pi/2$, so through same condition shaft moves four times in one rotation .

So, work done when wheel run in complete circle

$= 4 \, . \, w.L.R^2\pi/_{8g} \, [v^2 + R^2. \omega^2 - 56/_{33}.R.v. \omega]$

$= w.L.R^2\pi/_{2g}\,[v^2 + R^2.\,\omega^2 - 56/_{33}.R.v.\,\omega]$

Average work done per second = (total work done in rotation)/(time period)

and time period = $2.\,\pi/\,\omega$

So, work done per second = $\omega/_{2.\,\pi}.[\,w.L.R^2\pi/_{2g}\,(v^2 + R^2.\,\omega^2 - 56/_{33}.R.v.\,\omega)]$

$= w.L.R^2\,.\,\omega\,/_{4.g}\,(v^2 + R^2.\,\omega^2 - 56/_{33}.v.R.\,\omega)$

If δ is mass density of wind then $\delta = w/g$

So, work done per second = $\delta.L.R^2\,.\,\omega\,/_4\,(v^2 + R^2.\,\omega^2 - 56/_{33}.v.R.\,\omega)$

Power = $\delta.L.R^2\,.\,\omega\,/_4\,(v^2 + R^2.\,\omega^2 - 56/_{33}.v.R.\,\omega)$

In above mathematical model only one blade motion with horizontal wind is consider but horizontal blade will also get push from bottom. Means, at once two blade will get push one by horizontal wind and other by vertical wind.

So, Power = $2.\delta.L.R^2\,.\,\omega\,/_4\,(v^2 + R^2.\,\omega^2 - 56/_{33}.v.R.\,\omega)$

Power = $\delta.L.R^2\,.\,\omega\,/_2\,(v^2 + R^2.\,\omega^2 - 56/_{33}.v.R.\,\omega)$

Also, when front is less inclined to horizontal, the wind goes from above this blade strikes down on other adjacent blade. So, power generated will be more than calculated by above formula.

But for theoretical purpose consider

Power generated = $\delta.L.R^2\,.\,\omega\,/_2\,(v^2 + R^2.\,\omega^2 - 56/_{33}.v.R.\,\omega)$

Here, R. ω is the velocity of tip of blade. To generate more power R. ω should be less or angular velocity of the blade should be kept as small as possible by increasing & decreasing load on flywheel. (i.e. attaching more generator to it or discontinuing it as require which depends on velocity of wind.)

Abstract of the invention

In this windmill four blades are mounted on one shaft at right angles with one another and this shaft is fixed at the top of two opposite edges of top open rectangular box. So that in down half portion blades get cover and in top half portion blades are open to face wind of the atmosphere. Also, in bottom portion of box there are two ducts in opposite faces as shown in figure, which again guide the wind towards the horizontal blade to push it up.

When wind revolve the blade, which are perpendicular to it by direct impact on it. Big pulley attached to it also rotate on which chain is mounted which transfers the torque to series of generators through gear arrangement. Which by auto control keep the rotational speed of windmill as less as possible because that gives more and more power.

This model is submitted in Mumbai patent office for Patent.

EXCEL SHEET CALCULATION FOR DIFFERENT CASES

1) MASS DENSITY (δ) =	1.127	KG/CUM	
2)LENGTH (L) =	20	M	
3) WIDTH (R) =	30	M	
4)ANGULAR VELOCITY (ω) =	1	^{O}/SECOND=	0.017444 RAD/SECOND
5)VELOCITY OF WIND =	25	KM/HOUR=	6.944444 METER/SECOND
POWER =	δ. L.R^2.ω/2*(V^2+R^2.$ω^2$-56/33.V.R.ω)		
=	7490.174	WATT	
=	0.00749	MAGA WATT	

1) MASS DENSITY (δ) =	1.127	KG/CUM	
2)LENGTH (L) =	15	M	
3) WIDTH (R) =	20	M	
4)ANGULAR VELOCITY (ω) =	1	^{O}/SECOND=	0.017444 RAD/SECOND
5)VELOCITY OF WIND =	25	KM/HOUR=	6.944444 METER/SECOND
POWER =	δ. L.R^2.ω/2*(V^2+R^2.$ω^2$-56/33.V.R.ω)		
=	2608.998	WATT	
=	0.002609	MAGA WATT	

1) MASS DENSITY (δ) =	1.127	KG/CUM	
2)LENGTH (L) =	50	M	
3) WIDTH (R) =	25	M	
4)ANGULAR VELOCITY (ω) =	1	^{O}/SECOND=	0.017444 RAD/SECOND
5)VELOCITY OF WIND =	25	KM/HOUR=	6.944444 METER/SECOND
POWER =	δ. L.R^2.ω/2*(V^2+R^2.$ω^2$-56/33.V.R.ω)		
=	13293.82	WATT	
=	0.013294	MAGA WATT	

1) MASS DENSITY (δ) =	1.127	KG/CUM	
2)LENGTH (L) =	30	M	
3) WIDTH (R) =	20	M	
4)ANGULAR VELOCITY (ω) =	1	^{O}/SECOND=	0.017444 RAD/SECOND
5)VELOCITY OF WIND =	20	KM/HOUR=	5.555556 METER/SECOND
POWER =	δ. L.R^2.ω/2*(V^2+R^2.$ω^2$-56/33.V.R.ω)		
=	3267.088	WATT	
=	0.003267	MAGA WATT	

1) MASS DENSITY (δ) =	1.127	KG/CUM	
2)LENGTH (L) =	15	M	
3) WIDTH (R) =	20	M	
4)ANGULAR VELOCITY (ω) =	1	^{O}/SECOND=	0.017444 RAD/SECOND

5)VELOCITY OF WIND	=	20 KM/HOUR=	5.555556 METER/SECOND

POWER = $\delta . L.R^2.\omega/2*(V^2+R^2.\omega^2-56/33.V.R.\omega)$

= 1633.544 WATT

= 0.001634 MAGA WATT

1) MASS DENSITY (δ) =		1.127 KG/CUM	
2)LENGTH (L)	=	50 M	
3) WIDTH (R)	=	30 M	
4)ANGULAR VELOCITY (ω) =		1 ^{O}/SECOND=	0.017444 RAD/SECOND
5)VELOCITY OF WIND	=	19 KM/HOUR=	5.277778 METER/SECOND

POWER = $\delta . L.R^2.\omega/2*(V^2+R^2.\omega^2-56/33.V.R.\omega)$

= 10369.39 WATT

= 0.010369 MAGA WATT

MAHARASHTRA ENERGY DEVELOPMENT AGENCY
(A Government of Maharashtra Undertaking)

ISO 9001 : 2000 Reg. no. : RQ 91/2462
ISO 14001 : 1996 Reg. no. : RE 91/2461

Ref: RDP/Proposal-18/2006-07/8066 Date:21 December, 2006

To,

श्री. महेश वा.खटी,
९४, डॉ.आभोरेच्या मागे,
उज्जव सोसायटी, नरेंद्र नगर, नागपूर.

Sub: Ideas related to Non-conventional Energy & Energy Conservation
Ref: Your letter dt. 8-5-2006

Sir,

We are in receipt of your proposal regarding above subject. Thank you very much for showing your interest in our advertisement. We regret for delay in communication due to policy changes.

Your proposal was scrutinized by Technology Development Committee (TDC) and we are happy to inform you that your proposal has cleared the first stage during screening.

TDC has taken decision to get further details in specific format followed by your presentation. Meanwhile, new technology development policy and format for submission for proposal is under consideration of the Government for taking final decision.

New Policy and format will be sent to you soon. This is for your information please.

Thanking you,

Yours faithfully,

Dr. Sudhir Kumar
General Manager (R&D)

MHADA Commercial Complex, 2nd Floor, Opp. Tridal Nagar, Yerwada, Pune - 411 006.
el. No.: 020-26614393, 26614403, 26615311 Fax : 020-26615031 Gram : "MAHAURJA" E-mail : meda@vsnl.com Web-site : http://www.mahaurja.com

नागपूरच्या अभियंत्याने केले पवनचक्कीचे नवे मॉडेल

अतुल पेठकर
नागपूर, २ जानेवारी

स्थानिक बांधकाम विभागातील सहायक अभियंता महेश वामनराव खटी यांनी पवनचक्कीचे नवे मॉडेल तयार केले असून कमी खर्चात अधिक वीज निर्मिती करणाऱ्या मॉडेलचा प्रस्ताव महाराष्ट्र एनर्जी डेव्हलपमेंट एजंसीने (मेडा) स्वीकारला आहे.

खटी यांनी आपले मॉडेल स्वीकृतीसाठी मेडाकडे पाठवले असता मेडाच्या टेक्निकल डेव्हलपमेंट कमेटीने त्यांच्या मॉडेलची चाचणी केली. चाचणीच्या प्रथम टप्प्यात मॉडेलची उपयुक्तता सिद्ध झाली असून तज्ज्ञांच्या अभिप्रायानंतर त्यांचा प्रस्ताव मान्यतेसाठी केंद्राकडे पाठविण्यात येणार असल्याचे मेडाचे महाव्यवस्थापक (आर अॅण्ड डी) डॉ. सुधीर कुमार यांनी पत्राद्वारे कळवले आहे. तज्ज्ञांसमोर पवनचक्कीच्या मॉडेल्सचे प्रात्यक्षिक सादर करण्यास आपणास बोलाविण्यात आल्याची माहिती महेश खटी यांनी प्रस्तुत प्रतिनिधीला दिली.

पवनचक्कीचे हेच ते नवे मॉडेल


महेश खटी

खटी यांच्या या नव्या मॉडेलमुळे वाऱ्यापासून कमी खर्चात अधिक वीज निर्मिती करता येणे शक्य होणार आहे. साधारणपणे सध्या कार्यरत पवनचक्कीमध्ये पाते आणि शॉफ्ट यांना जोडणारी जागा कमी असते. मात्र आपल्या नव्या मॉडेलमध्ये ही जागा भरपूर असल्याने आणि पात्यांचे फिरणे आणि हवेची दिशा सारखी असल्याने वीज निर्मितीचा वेग वाढेल असा दावा खटी यांनी केला.