

## Development of Demonstration Wind Power Projects:

### 1) WIND ENERGY:

The wind power generation is not totally new thought. As per policy guidelines of MNRE and to attract the private investment in this sector demonstration wind power projects were taken up by MEDA with assistance from MNRE and state of Maharashtra, which are found most successful. On successful demonstration of these projects many private developers are encouraged & due to same the wind power projects installed capacity is of 1931.860 MW up to March 2009.

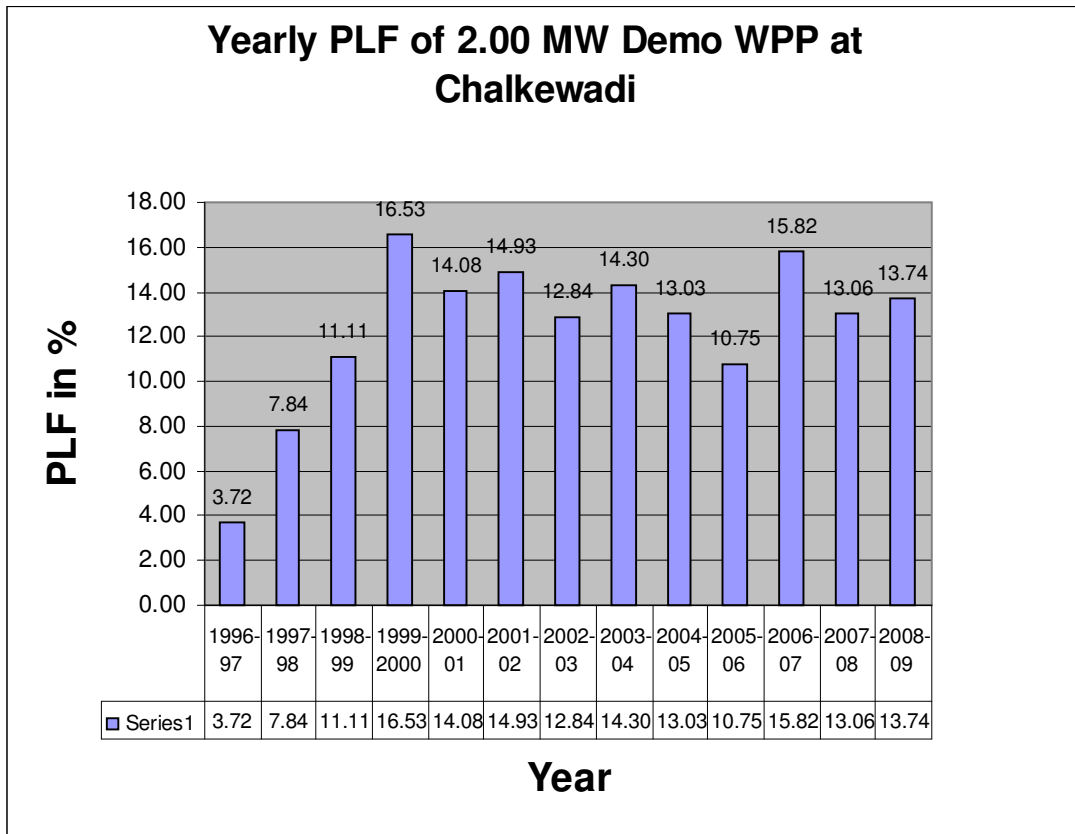
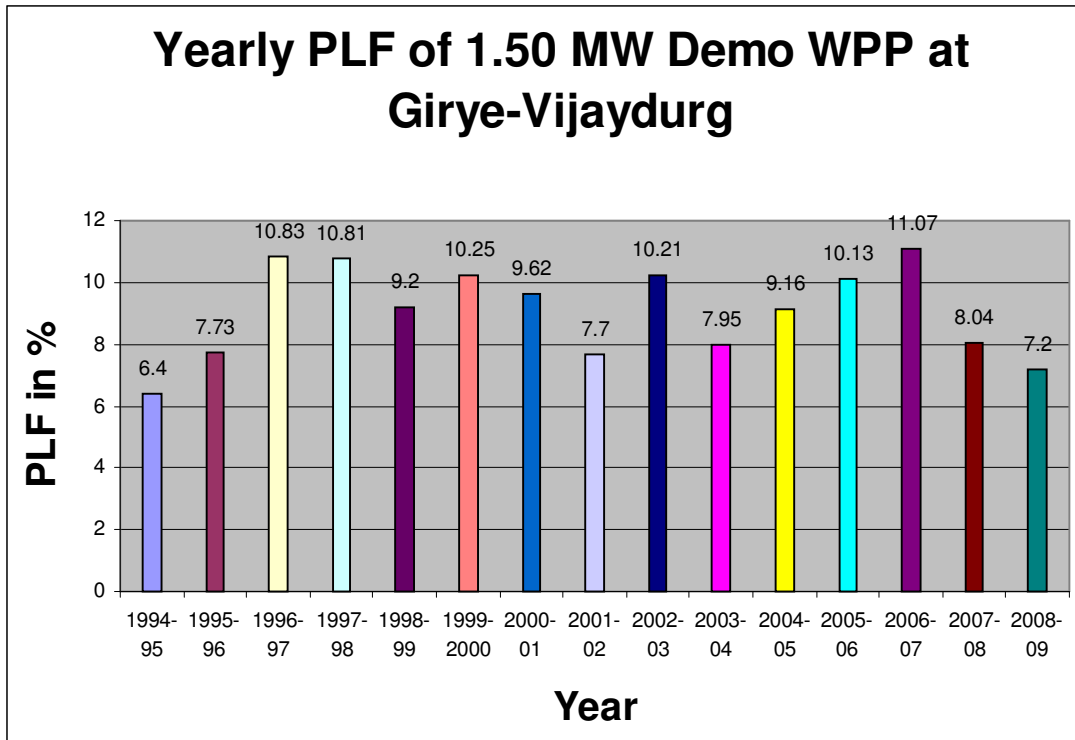
Year wise demonstration wind power projects commissioned by MEDA in state of Maharashtra are as under -

Sr. No.	Location	Capacity (MW)	Type of WEG	Rotor Dia.	Details of Tower		Commissioned Date
					Tower Height in Meter	Type of Tower	
1	<b>Vijaydurg (Girye)</b> Tal. Deogad, Dist. Sindhudurg	1.50	6 x 250 kW BHEL / NORDEX	27 m (530 sq.mt.)	30 meter	Lattice type	July, 1994
2	<b>Chalkewadi - I</b> Tal. & Dist. Satara	2.00	8 x 250 kW BHEL / NORDEX	29 m (693 sq.mt.)	6 no. of 30m 2 no. of 40m	Lattice type	Nov. 1996
3	<b>Gudepanchgani</b> Tal. Shirala, Dist. Sangli	1.84	8 x 230 kW Enercon	30 m (707 sq.mt.)	48 m	Tubular type	May, 1999
4	<b>Motha</b> Tal. Chikhaldara, Dist. Amravati	2.00	2 x 1000 kW Suzlon	62 m (3019 sq.mt)	65 m	Lattice type	June, 2003
5	<b>Chalkewadi - II</b> Tal. & Dist. Satara	3.75	3 x 1250 kW Suzlon	64 m (3217 sq.mt.)	56 m	Tubular type	Sept, 2004
<b>Total</b>		<b>11.09 M W</b>					

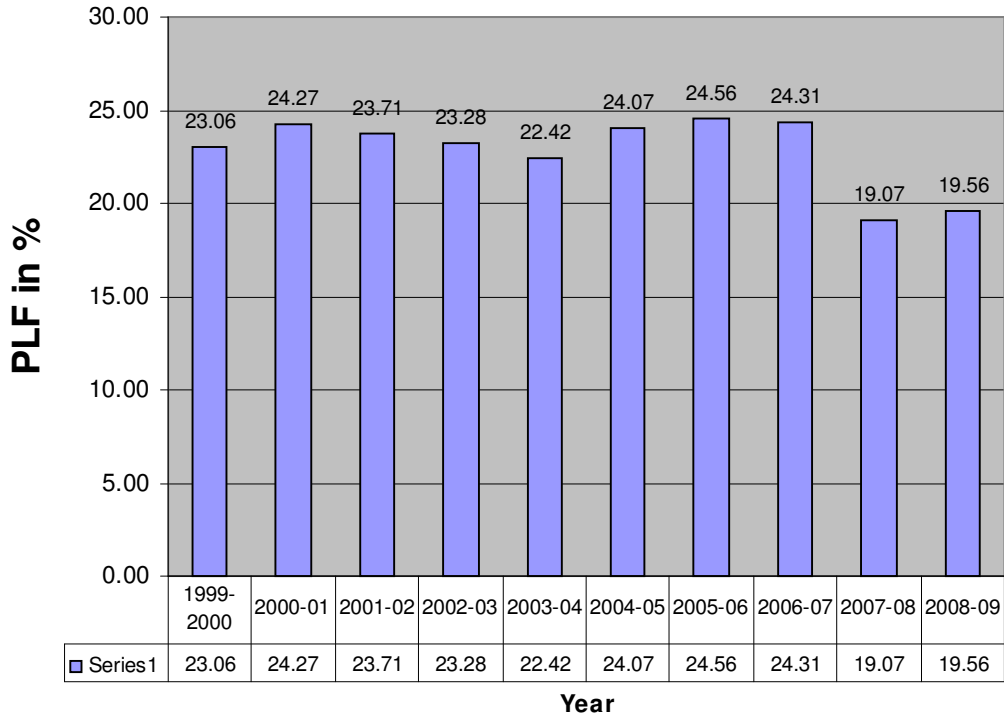
### Generation details of the MEDA'S Demonstration Wind Power Project during 2008-09

Sr. No.		<b>Chalkewadi -I, Dist. Satara 8x 250 KW (2.00 MW)</b>	<b>Chalkewadi -II, Dist. Satara 3x1250 KW (3.75 MW)</b>	<b>Vijaydurg, Dist. Sindhudurg 6x250 kW (1.50 MW)</b>	<b>Gudepanchgani, Dist. Sangli 8x230KW (1.84 MW)</b>	<b>Motha, Dist. Amravati 2x1000KW (2.00 MW)</b>	<b>Total Generation (kWh) &amp; Avg. PLF all Demo WPP in %</b>
1.	Site-wise generation	24,06,624.40	71,92,044	9,46,080	31,53,119	34,01,898	17.10 MUs
2.	PLF for 2008-09	13.74 %	21.89 %	7.20 %	19.56 %	19.42 %	Avg. PLF- 17.60 %

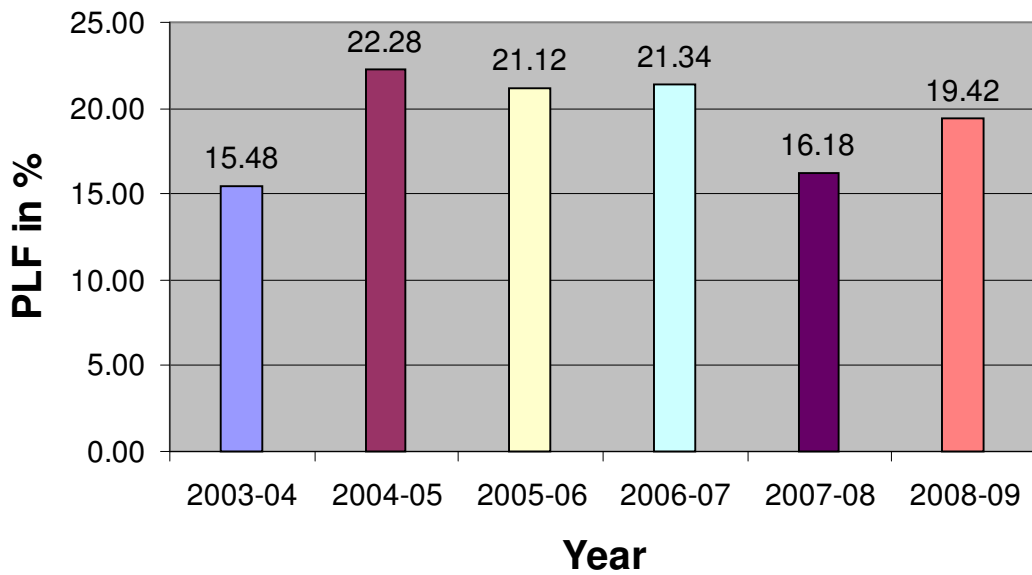
Graphical representation of yearly PLF:-



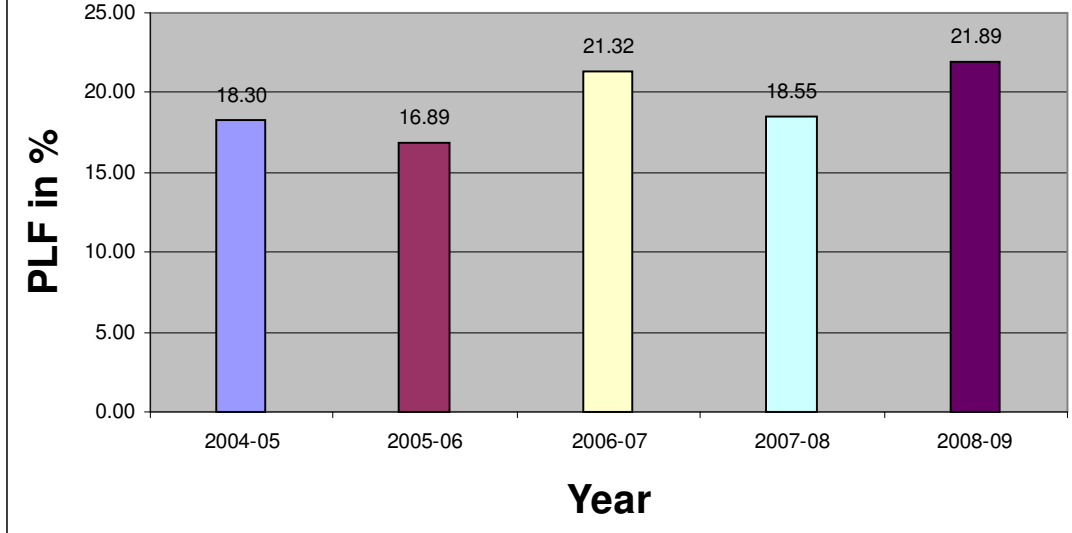
### Yearly PLF of 1.84 MW Demo. WPP at Gudepanchgani



### Yearly PLF of 2.00 MW Demo WPP at Motha



## Yearly PLF of 3.75 MW Demo WPP at Chalkewadi -II



## 2) Infrastructure Development:-

### 2.1 Land acquisition for Demonstration wind power projects :-

The land acquired by MEDA is utilized for Demonstration wind power project & balance land can be utilized for proposed wind power projects to be installed in future. The details of the land at various Project sites in Maharashtra are as given below.

S.N	Name of the site	Taluka	District	Land details in Hect.		
				Land acquired	Land used for project	Balance Land
1	Vijaydurg, Girye	Deovgad	Sindhudurg	47.60	6.6	41.0
2	Chalkewdai - I	Satara	Satara	40.00	15.0	Nil
3	Chalkewdai - II	Satara	Satara		25.0	Nil
4	Gudepachgani	Shirala	Sangli	44.16	14.0	30.16
5	Motha	Chikhaldara	Amravati	51.93	15.0	36.93
6	Sautada	Patoda	Beed	54.23	Nil	54.23
7	Jagmin	Satara	Satara	39.40	Nil	39.40
<b>Total land in Hect.</b>				<b>277.32</b>	<b>75.6</b>	<b>201.72</b>

### 2.2 Necessity of Infrastructure Development :-

Windy sites declared in Maharashtra are located in remote & hilly areas. There is no transmission network set up and approach roads to access these areas which are basic need for development of wind power projects. Through the careful planning, it is required to make sure that the infrastructure is developed before setting up the projects.

### **2.3 Infrastructure Development for Wind Energy Projects: Under Wind Power Policy 12.3.1998**

#### **a) Evacuation Arrangement:**

The power evacuation arrangement mainly included the laying of High Voltage (HV) Transmission lines of 33KV to 220 KV ratings from the projects sites to the nearby HV/EHV Sub stations. As per the policy guidelines, the expenses on account of the evacuation arrangement of HV/EHV were to be borne by MSEDCL/MSETCL (Former - MSEB Maharashtra State Electricity Board). Afterwards MEDA was to recover 50 % of this share from the private sector developers / investors and hand it over to MSEB. Accordingly, MEDA contributed 50 % of this share through private sector developers / investors and MSEB contributed for the balance 50 % share.

#### **b) Approach Roads :**

As per the policy, the responsibility of construction of Approach Roads to all Wind Power Project sites was given to MEDA. Accordingly MEDA constructed the Approach roads and interconnecting roads to various sites in Satara and Sangli districts. It included construction of new roads, widening and strengthening of some of the old roads, construction of bridges, CD works etc.

In this respect, MEDA so far has completed the 66 km of roads. The brief work wise summary of road work is as follows

<b>S No</b>	<b>Wind Farm locations</b>	<b>Length of Road Km.</b>
1	Vankusvade, Dist: Satara. / Supa, Dist : A Nagar.	24.954
2	Thoseghar, Bhamberwadi, Matrewadi, Warekarwadi etc.in Dist: Satara & Dhalgaon Dist: Sangali ,	24.562
3	Chalkewadi , Thoseghar Dist. Satara	8.150
4	Sada Waghapur ( Keral)	6.00
5	Chalkewadi, Dist : Satara	2.50
	<b>Total</b>	<b>66.216</b>

MEDA has constructed an Approach road of length 1.7 Km at Demonstration Wind power Project, 3.75 MW capacities at Chalkewadi Taluka & District Satara.

### **C) Satara - Chalkewadi - Patan Road:**

As a special assignment, MEDA also took up the widening and strengthening of road from Satara to Chalkewadi to Vankusavade and Patan. Maharashtra State Road Development Corporation (MSRDC) was awarded the responsibility to undertake the roadwork. This was 31 km long road, linking Satara and Patan via Chalkewadi and Vankusavade.

The experience gained through the earlier infrastructure development was encouraging. Taking into consideration the earlier hurdles, it was proposed that a proper system to be laid in order to develop infrastructure timely so that the wind developers are comfortable in setting up the projects.

### **2.4 Infrastructure Development under wind power generation policy -2004:**

#### **INCENTIVES UNDER WIND POWER POLICY DECLARED BY GOVERNMENT OF MAHARASHTRA ON 26<sup>TH</sup> FEBRUARY 2004**

- **Green Power Fund:** Announcement of constitution of Green energy fund for development of infrastructure facility required for non-conventional energy sources is constituted by Government of Maharashtra.
- **Evacuation Arrangement:** For Evacuation arrangement of wind energy project, 50% amount will be given as a subsidy through Green Energy Fund & 50% amount will be given as a loan without interest. The loan will be repaid by MSEB/ Transmission licensees after commissioning and transferring the ownership of Evacuation arrangement to MSEB/Transmission/ Distribution licensees/ Utilities in five equal yearly installments.
- **Approach Roads:** 100% expenditure for construction of approach roads for wind energy projects will be met through Green Energy Fund.

The expenditure incurred by private developers for erection and commissioning of evacuation arrangement limited to estimated cost is eligible for reimbursement through green energy fund by MEDA after commissioning and handing over the evacuation arrangement to MSETCL/MSEDCL. The repayment shall be made depending upon availability of green energy fund and will be restricted to maximum of Utility estimates or actual expenditure whichever is less. Evacuation arrangement shall be handed over to Utility, after commissioning and at the same time the responsibility of repayment of the 50% loan without interest shall also rest with Utility.

The repayment of 50% loan without interest, towards evacuation arrangement shall be made by Utility in five equal installments in five years starting after one year from date of commissioning of evacuation arrangement. The ownership of evacuation arrangements shall remain with Utility and its operation and maintenance shall be undertaken by Utility.

Following the GOM policy vize Wind Power Generation Policy -2004 wind power projects development took place in Dhule, Nandurbar, Nashik, Ahemadnagar Satara, Sangli district of Maharashtra. Further to this policy & following the directives of GoM is line with the policy the targeted capacity addition of 750 MW was achieved

by end of Sept. 2006. However the wind power generation capacity by 31<sup>st</sup> March 2009 is reached to 1931.860 MW.

Following grid evacuation facilities are developed during 10th five year plan:

Sr No	Location	Commissioned Date	EHV Sub-station with bay	EHV Lines			
				220 KV	132 KV	110 KV	33 KV
1	Motha, Dist. Amravati	June, 2003					5.67 km s/c
2	Chalkewadi-II, Dist. Satara	Sept, 2004					0.12 km s/c
3	Brahmanwel, Dist. Dhule		220/33 KV . 4x 100 MVA X <sub>mer</sub>	40 km D/c			
4	Brahmanwel, Dist. Dhule		220/33 KV . 2x 100 MVA X <sub>mer</sub>	20 km D/c			
5	Dhalgaon, Dist. Sangli		220/33 KV . 2x 100 MVA X <sub>mer</sub>	40 km S/c			
6	Brahmanwel, Dist. Dhule						20 km D/c
7	Dhalgaon, Dist. Sangli						10 km s/c
8	Dhalgaon, Dist. Sangli						3 km S/c
9	Chakla, Nandurbar						10 km S/c
10	Bhamberwadi, Dist. Sangli		110/33 KV, 2 x 50 MVA X <sub>mer</sub>			0.8 km D/c	
11	Panchpatta, Dist. A'nagar		132/33 KV, 2 x 50 MVA X <sub>mer</sub>		6.5 km D/c		
12	Brahmanwel, Dist. Dhule		132/33 KV, 50 MVA X <sub>mer</sub>				
13	Gudepanchgani, Sangli		132/33 KV, 25 MVA X <sub>mer</sub>				
<b>Total</b>				<b>100 km</b>	<b>6.5 km</b>	<b>0.8 km</b>	<b>48.79 km</b>

## 2.5 Development of Approach Roads:

While setting up of the wind farm projects at new sites, transportations of heavy equipments like 350 tone capacity cranes, 90 ton trailers, blades of 30 m length, towers, Nacelles etc through difficult Ghat section is a critical task for developer and may adversely affect the developmental activity of project, if approaches not suitable to facilitate transportation.

Under the wind power policy – 2004 MEDA has to get the approach roads construction by MSRDC or PWD through Green Energy Funds. However by seeing the earlier experience it takes significant time period to construct the roads. Hence in order to achieve the speedy development, MEDA shall undertake the approach road works through PWD/MSRDC. The 100% expenditure required for such work is eligible to be incurred through green energy fund.

## 3) Rainfall and wind mills:-

It is observed that most of the potential wind power project sites are concentrated in Satara and Sangli districts. Obviously the initial development is concentrated in these two districts and to some extent in Ahmednagar district. With the sudden development of wind energy in Satara and Sangli districts the public

opposition also popped up consequently and people started linking the wind turbine operation with low rain fall. The strong rumors were spread that these wind mills are affecting rain in that area. In fact many districts of Maharashtra have received less rain fall where there are no wind mills. And few districts where wind mills have been installed have received rain fall much above the average rain fall. But people were not ready to believe it and the issue became very critical and sensitive.

In view of this, GoM had constituted a committee which was chaired by Shri Pant, Head, IMD, Pune & other scientist to observe the impact of wind mill on rainfall. The committee retreated the matter & opinioned that the wind mill has no relevance with monsoon phenomenon.

#### 4) Plan for Future Development:

In order to have a balanced development all over the state and to explore the sites with significant wind potential, it was proposed that the wind development at Dhule, Nandurbar, Nashik, Ahemadnagar, districts is proposed to be undertaken during the balance period .

This also justifies shifting the programme from these two districts to other districts since windy sites in these districts are the best option at this stage. At Brahmanwel site the wind power density at 50 m height is 324 W/m<sup>2</sup> and average mean annual wind speed is 23.10. KMPH. For 2002-03 the average PLF achieved at Brahmanwel site is 21.78 % which is above the 20% PLF criteria prescribed by MERC for group –III projects (new power projects) commissioned after 1<sup>st</sup> April, 2003.

#### Accessibility to EHV Substations:

The existing EHV sub-stations in Dhule and Nandurbar Sangali Ahemadnagar district are as follows:

1. 132 KV Substation at Sakri
2. 220 KV Substation at Dondaicha
3. 220 KV & 400 KV Substation at Dhule
4. 132 KV Substation at Visarwadi
5. 220 kV Substation at Vita
6. 220 kV Substation at Ahemadnagar

Approximate distances from project sites to Sakri, Dondaicha, and Dhule are as follows:

<b>Takarmouli<sup>#</sup></b>	to	Sakri	:	30 km
<b>Brahmanwel<sup>#</sup></b>	to	Sakri	:	32 km
<b>Raipuir<sup>#</sup></b>	to	Sakri	:	15 km
Dhule	to	Sakri	:	55 km
Dhule	to	Dondaicha	:	56 km
Dondaicha	to	Sakri	:	58 km
Dondaicha	to	Nandurbar	:	32 km

# Wind power project potential site.

5) **Government of India, Ministry of Environment and Forests has declared the Guidelines for diversion of forest land for non-forest purpose under the Forest (Conservation) Act, 1980-For projects utilizing Wind Energy thereof vide F.No.8-84/2002-FC dated 10-11-2003 & 14-5-2004.**

Several potential sites of high wind density are situated in forest areas. It is proposed to tap this huge potential by allowing wind power projects on following guidelines.

- Areas of national parks and sanctuaries, areas of outstanding natural beauty, national heritage sites, sites of archeological importance, sites of special scientific interest and other important landscapes will not be considered for development of wind farm. Wind farms should be at safe distance (1 km or more) from these sites as these sites have ample tourism potential. The distance of windmills from highways, villages or natural habitations should be minimum 300 meters. No Objection Certificate from local bodies will be mandatory as these machines make lot of noise. The tips of wind turbine should be painted with orange color to avoid bird hits.
- Forest dept will allow installation Wind Mast by paying one time payment of one lakh per mast. It will provide 15m X 15m land for every fifty hector of land for this purpose. The wind mast should be removed after two years only after ascertaining technical parameters.
- Only machines of 500 KW and above will be allowed.
- Forest land will be leased for 30 years initially. It will be first leased in favor of developer and then transferred in the name investor/power producer within period of four years. If developers fail to develop wind farms, land will be revert back to Forest Department without any compensation. A lease rent of Rs. 30,000/- will be charged in addition to compensatory forestation and net present value.
- Proposal for forest land inclusive of the corridors between successive windmills, statutory buildings, earthing pits, transmission lines, roads including repose, breast walls, drains, curvature etc. Alignment of road should be done by recognized firm and got approved by the divisional forest officer concerned. The transmission lines should be aligned with roads as far as possible.
- Details of alternative explored on non forest land, cost benefit analysis of project, employment generated, cost of electricity produced and economic viability should be also given in proposal. Proposal should also include detail technological parameters about mechanical fatigue.
- Around 65% to 70% of leased out area should be utilized for development of medicinal plants. Intervening areas between two wind mill foot prints shall also be planted up by dwarf species of trees at the project cost. Soil and moisture conservation measures like counter trenching shall be taken up on hillocks supporting the windmills.
- As Maharashtra state forest department does not have expertise in wind power projects to scrutinize proposals. Hence all proposals for forest land diversion should be scrutinized by MEDA and with their recommendation shall be forwarded to state forest department.

