Wind Pumps: The Gujarat Experience

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- In India, the first systematic attempt for wind energy utilization began in 1952 under the Council of Scientific and Industrial Research (CSIR)
- The National Aeronautics Laboratory (NAL) took up the design and development of a sail windmill
- Indian Institute of Science under a TOOL-ORP windmills project developed 2 types of windmills namely 12-PU-500 and 12-PU-350, suitable for low wind regimes were installed in Ghazipur to study the feasibility of these windmills for irrigation
- Gujarat Energy Development Agency has also developed four prototypes of windmills to suit agro climatic conditions in Gujarat.
- These developments were greatly accelerated by the Department of Non-conventional Energy Sources after its formation in 1982. A recent study has estimated a potential of 0.4 million wind pumps countrywide at the present level of the technology.

Wind Pumps: Milestones in India

- 1950
  - Wind pumps were officially introduced in India.
  - 100 Australian machines were imported by the Public Health Department, GOI.
- 1952
  - First systematic application for irrigation attempted by the Council of Scientific and Industrial Research (CSIR) & NAL.

Early Efforts: ‘Home-made’ Wind Pumps

- Indigenous models made from bamboo and sail-cloth.
  - Low-grade technology
  - No long term programme to pursue the technology development.
  - Dispersed activities with little or meager co-ordination.
- 1970
  - Pumps like CEZARI, NAL-MP Series and ANILA developed.
  - 12-PU-500 installed by Institute of Rural Technology (IERT), Aallahabad under a Demo Project was based on a Dutch design.

Spreading of the Movement

- 200 systems installed in Andhra Pradesh, Gujarat, Tamil Nadu and Uttar Pradesh under a Demonstration Project for
  - Small irrigation needs and domestic use in institutes, homes, schools and construction sites.
  - Models introduced were WF 305 G (Windfab), DW 300 (Auto Spares), Green Revolution (NEPC) and DWP –150 (SICO) and few yellow Tail Machines imported from Australia were tried on various terrains.

Wind Pumps: The *Swadesh*i Revolution in Gujarat

- Machines imported form Australia were installed in Saurashtra and Kachchh region of the state.
- Gandhian ideology - self-reliance movement also helped the spread of the technology to a greater extent.
- Though little documentation is there regarding the spread of the technology, few remnants of the windmills or names such as Pavanchakki bud Stop or Pavanchakki Office in area where wind pumps existed.
- Despite these developments, efforts to improve the technology design and new models by various enthusiastic and die-hard Gandhian village workers continued

The *Swadesh*i Revolution continues in Gujarat

- NGOs like J. C. Kumarappa and Rural ngineering School, Gadhada and Om Engineering Works, Anjar are some of the frontline manufacturers and promoters of this technology all over Saurashtra and Kachchh.

Innovations for a new Era in Gujarat

- 1972
  - Experiments initiated in Porbander at the Community Polytechnic Wing supported by Department of Science & Technology(DST).
  - The project aimed at design modifications of the 12-PU-500 model to suit local needs.
- 1977
  - The first pumps were manufactured in Ghazipur (UP) and later the Polytechnic started its manufacturing and promoting the systems.
- 1977
  - A pilot project taken up by CSMCRI installed 10pumps in the state.

The NWDP comes to Gujarat

- 1981-82
  - GEDA in co-ordination of CSMCRI with the 10 experimental models of different designs installed & demonstrated the technology.
- 1982
  - MNRE launched the National Wind Pumps Demonstration Programme (NWDP) taken up the installation of the 12-PU-500 model for drinking water and minor irrigation requirements.

Overcoming Setbacks: Redesigning the 12-PU-500

- A reliability study carried out to reveal faults in Pumping components
  - Transmission elements
  - Furling mechanism
  - Mis-matched alignment
  - Poor quality material
- Suggested tolerance of the components, design modifications to overcome misalignments, jamming of the pump, buckling of transmission rods and pumping mainly recommended to suit the deep water tables and high winds regimes of the state.

WIND PUMP INSTALLED UNDER MNRE SCHEME OF SMALL WIND HYBRID SYSTEM SINCE 1994-95

Sr. no.	Year of Sanction	No. of Wind Mills Sanctioned	Commissioned during year												Total
			94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	
1	94-95	36	3	32	1	-	-	-	-	-	-	-	-	-	36
2	95-96	24	-	-	12	12	-	-	-	-	-	-	-	-	24
3	96-97	74	-	-	23	45	6	-	-	-	-	-	-	-	74
4	97-98	0	-	-	-	-	-	-	-	-	-	-	-	-	-
5	98-99	68	-	-	-	-	-	46	22	-	-	-	-	-	68
6	99-00	50	-	-	-	-	-	30	20	-	-	-	-	-	50
7	00-01	95	-	-	-	-	-	-	15	45	35	-	-	-	95
8	01-02	89	-	-	-	-	-	-	-	26	23	5	-	-	89
9	02-03	81	-	-	-	-	-	-	-	-	31	29	21	-	81
10	03-04	39	-	-	-	-	-	-	-	-	-	19	10	10	39
11	04-05	95	-	-	-	-	-	-	-	-	-	-	18	77	95
12	05-06	75	-	-	-	-	-	-	-	-	-	-	-	19	19
13	06-07	-	-	-	-	-	-	-	-	-	-	-	-	-	
14	07-08	-	-	-	-	-	-	-	-	-	-	-	-	-	
15	08-09	-	-	-	-	-	-	-	-	-	-	-	-	-	
16	09-10	-	-	-	-	-	-	-	-	-	-	-	-	-	
17	10-11		-	-	-	-	-	-	-	-	-	-	-	-	
18	11-12		-						-	-	-	-	-	-	
19	12-13		-	-	-	-	-	-	-	-	-	-	-	-	
20	13-14														
21	14-15														
22	15-16														
	Total	726	3	32	36	57	6	86	57	71	89	76	38	106	646

Implementing the Programme of SWES

- Wind Pumps promoted(Specifications)
  - Gear-type 18-blade systems suitable for pumping water from 100 ft. depth
  - 3-meter rotor dia., 10 meter height, 18 blades
- Cost per wind pump during current FY 16-17: Rs. 125,000 approx.
- Out of above CFA(MNRE) provision is Rs.30000/- & SFA(GEDA) is also Rs.30000/- per wind mill

Implementing Methodology

- Short listing suppliers
  - Invitation of rates from MNRE approved manufacturers.
  - Shortlisting & authorizing suppliers
- Selection of Beneficiaries
  - authorized manufacturers select the beneficiaries & in turn submit the list to GEDA in prescribed format for verification & approval
- Installation & commissioning
  - Upon GEDA approval, authorized manufacturers are given clearance for further installation of wind mills
  - Training is imparted to the beneficiaries for O & M during installation
  - Four quarterly services are provided to the beneficiaries during first year of commissioning
  - Physical verification & inspection upon submission of reports of installations prior to release of SFA/CFA

Type of Models

- Gear Type
- Direct acting
- Gear Type wind mills are having less maintenance as the speed of rotor is controlled by ratio of 3:1
- In Direct Drive the Pump is directly connected to the Cam of rotor and it moves with the every rotation of the rotor. In high speed of wind the pump road gets buckled and damages the pumping system

DETAILS OF WIND PUMPS INSTALLED IN GUJARAT

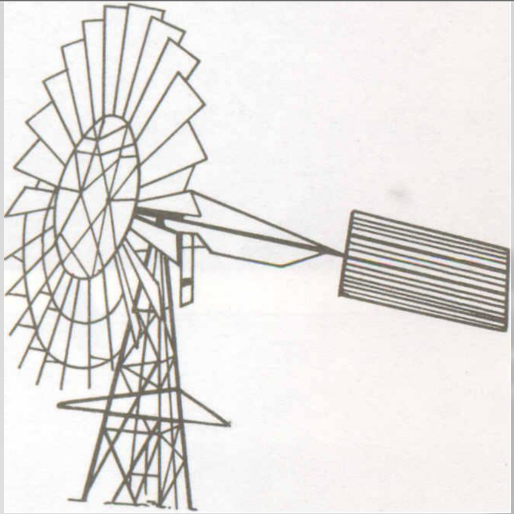
Sr. No.	Model of Wind Pump	Name of the Manufacturer	Specifications					No. of Installed nos.
			D	Ht	B	G	d	
1	Different							6
2	12-PU-500	IERT-Allabad	5	5	12		15.24	97
3	Modified 12-PU-500	Hi-Speed Terbo Drive V.V. Nagar, Gujarat	5	6.5	12		15.24	5
4	Yellotail	W. D. Moore & Co. Austreliya	4.2	10	24	3:01	10.16	4
5	Nityanand	Om Engineering Works Anjar, Dist:-Kutch	3	10	18	3:01	7.62	38
6	GM-2	Rural Engineering School At:-Rojmal, Ta:-Gadhada Dist:-Bhavnagar	3	10	18	3:01	7.62	222
7	DW 300 G	Auto Spare Ind. Pondicherry	3	10	18	3:01	7.62	14
8	STRUCON	Strucon Dev. Services	4.2	15	24	3:01	10.16	1
9	Blue Tail	Govt. Politechnic Porbander	4.2	15	24	3:01	10.16	1
10	PDTC	PDTC-Rajkot	4.2	15	24	3:01	10.16	1
11	Nityanand	Om Engineering Works Anjar, Dist:-Kutch	5	12	24	3:01	15.24	1
12	SICO - MORE	The Scientific Instruments Co. Ltd, Gaziabad	3	10	18	3:01	7.62	20
13	Marut 3-10	Marut Energy Equipments Pvt. Ltd, Nasik	3	10	18	3:01	7.62	267

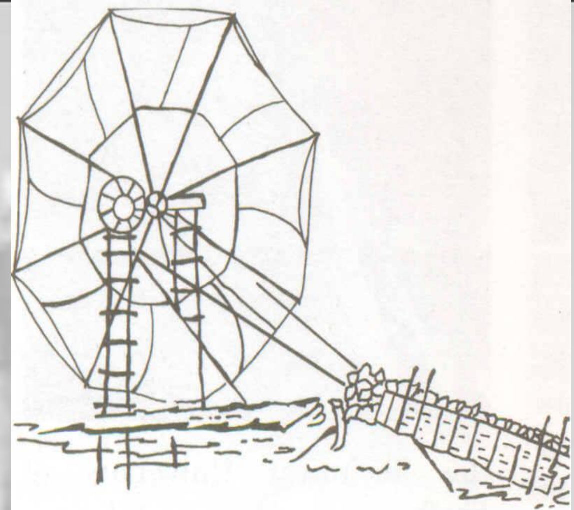
Operation & Maintenance of Water Pumping Wind Mill

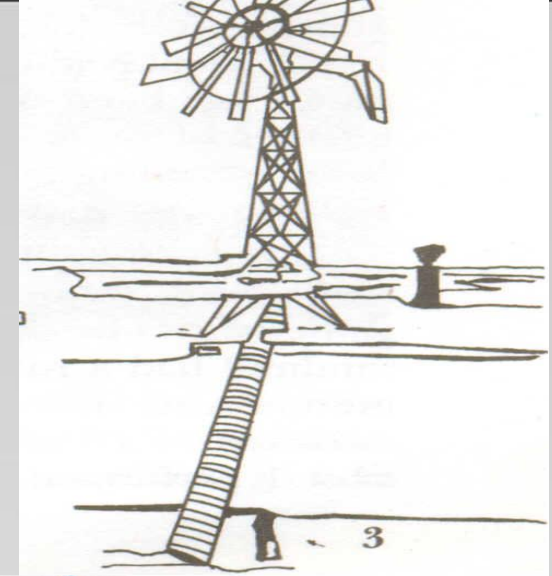
- Wind Pump is a very simple system fabricated from M. S. angles and channels having cast Iron of M. S (oil merge) Gear Box with Gear up to ¼ level of its bottom.

- Following checks keeps Wind Mill running smoothly for longer period with good efficiency.

1. Over oiling ofWind Pump at every quarter.
2. Cleaning of Pump and Foot Valve at every quarter or as and when required for better efficiency.
3. Tightening of all nut bolts at every month.



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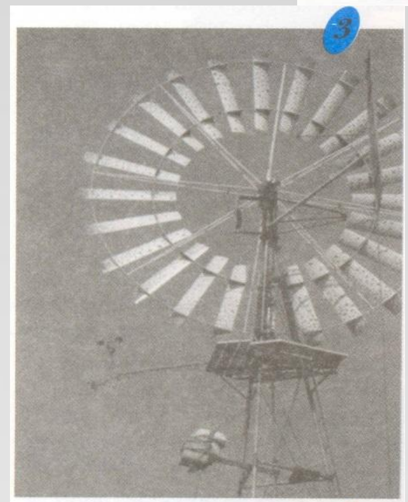
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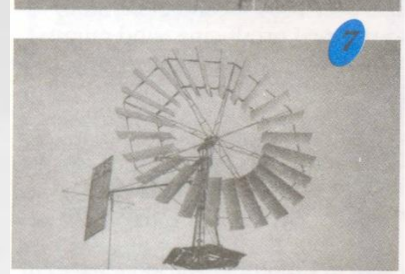
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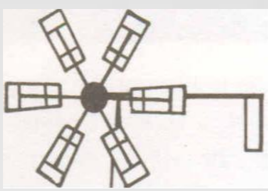

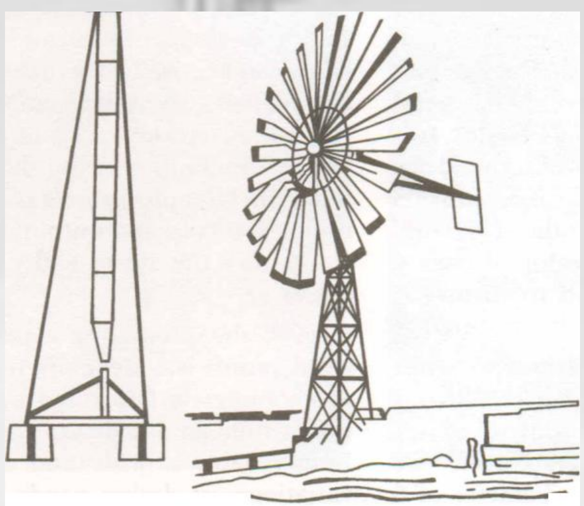

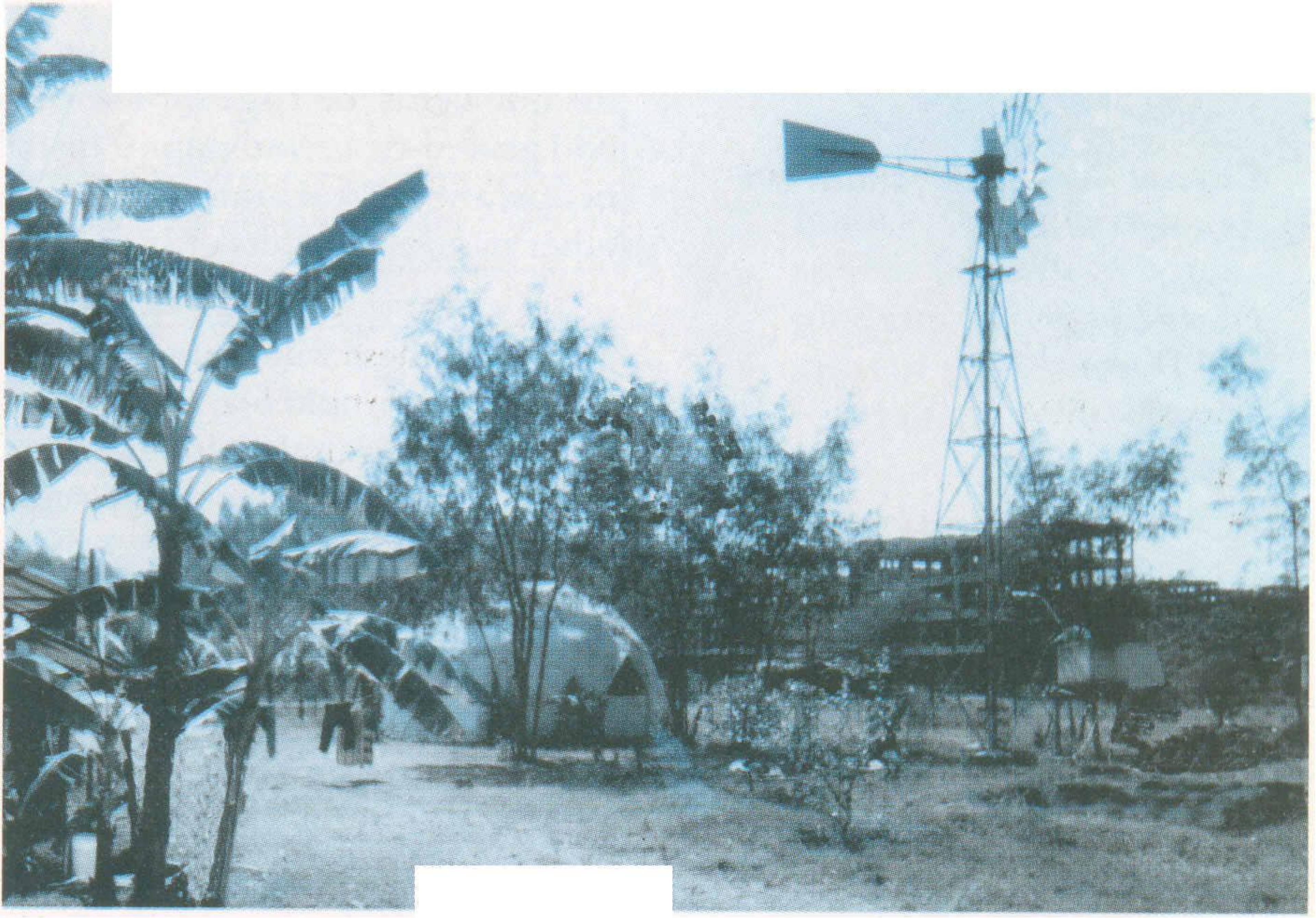

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