

RENEWABLE
ENERGY

Sector Brief

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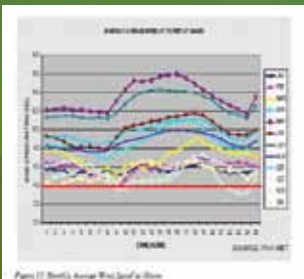
**Sindh Board of
Investment**
Government of Sindh



INTRODUCTION

The world witnessed economic growth and prosperity since the industrial revolution mainly due to increased efficiencies in the use of better and higher concentrations of energy in fossil fuels. The excessive usage has comparatively increased the consumption rate of fossil fuel over its production, resultantly impacting human life and modern technological society which currently is heavily dependent on oil as a fuel. The development of the renewable energy sources is imperative to avoid complete dependence on crude oil and many countries blessed with renewable energy natural resources are rapidly turning towards clean fuel. Pakistan is among such countries which is abundantly blessed by nature with renewable energy like wind and solar. Pakistan, being on the Sun Belt, is highly suitable for generation of electricity through solar. Global irradiation falling on the horizontal surface is about 1,800-2,200 kWh/m² per year. At current efficiency levels of 18% for solar modules this is sufficient to produce 0.320 to 0.400 MWh of electricity per m² per year (Source: German National Meteorological Service - DWD). With huge availability of sunlight, Sindh holds a great potential for extensive exploitation of solar energy for not only agriculture but also for the extensive use of environmental-friendly alternative energy for households. Sindh according to the wind data gathered by the Pakistan Meteorological Department (MET Department), the coastal belt of Sindh has huge potential for the development of wind energy projects. The 'wind corridor' of Sindh stretches from Keti Bandar to Gharo and is capable of producing 50,000 MW of electricity.

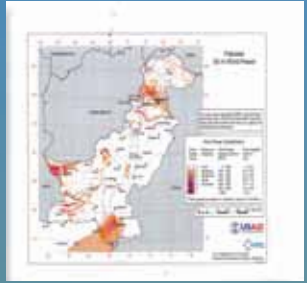
WIND ENERGY:



Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity, wind mills for mechanical power, wind pumps for pumping water or drainage, or sails to propel ships. Wind energy corridor of Gharo with 60 km wide and 180 km long up to Hyderabad with average speed of 10 m/sec has

huge potential to play a vital role in ensuring all-round development and growth of economy of a nation. The escalating cost of diesel and electricity can be offset by setting wind pumps to run tube-well for extracting water from the ground for irrigation purposes.

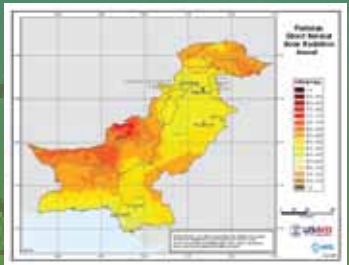
Many international companies have already shown keen interest in establishing wind turbines to make electricity. A 5 MW wind power plant established by Zorlu energy Pakistan of has already started producing electricity. Al-Tawarqi Steel of Saudi Arabia is also in process of establishing pilot wind power plant at its site at port Qasim.



The growing demand of energy in the economy of the country and availability of adequate natural resource reflects investment opportunities for the investors.

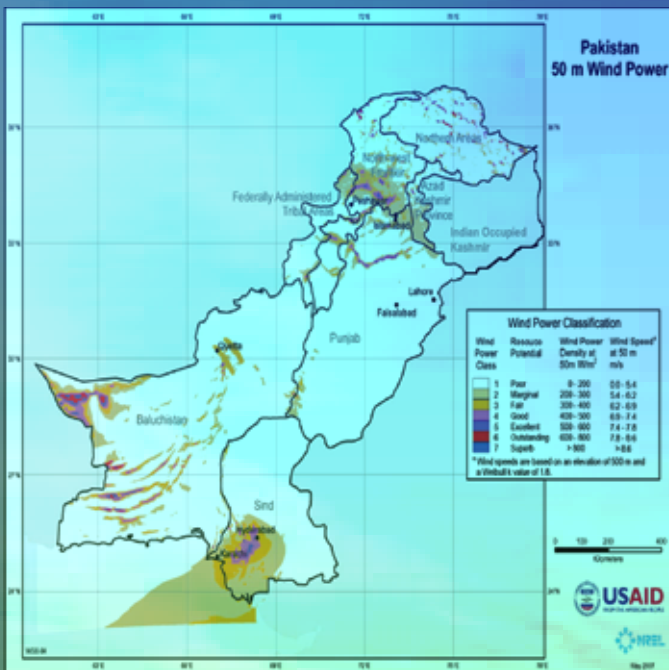
SOLAR ENERGY:

Solar energy source is widely distributed and abundantly available in Pakistan. With average 5.5-6 KWh/m²/day and about 1,800-2,200 kWh/m² per year radiation, Sindh has tremendous potential of harnessing this natural resource to produce 0.320 to 0.400 MWh of electric



ity per m² per year. With annual mean sunshine duration of 8 - 8.5 hours a day, it is estimated that this amount of energy is enough to electrify 40,000 villages. The solar-powered tube-wells/pumping machines for extracting underground water and land reclamation can be used to install in a water-logged and salinity-hit area besides using it for irrigation and drinking water usages. Due to huge availability of sunlight, Sindh holds a great investment potential for extensive exploitation of solar energy for not only agriculture but also for the extensive use of environmental-friendly alternative energy for households, offices, hospitals, schools and mosques.

Pakistan 50 m Wind Power



Wind Power Class	Resource Potential	Wind Power Density at 50m (W/m ²)	Wind Speed* at 50 m (m/s)
1	Poor	0-200	0.0-5.4
2	Marginal	200-300	5.4-6.2
3	Fair	300-400	6.2-6.9
4	Good	400-500	6.9-7.4
5	Excellent	500-600	7.4-7.8
6	Outstanding	600-800	7.8-8.6
7	Superb	>800	>8.6

*Wind speeds are based on an elevation of 50m and a Weibull's value of 1.8.



May 2007



Sindh Board of Investment

is the primary investment promotion agency of the Province positioning Sindh as an attractive destination for investment.

SBI strives to find new avenues for public private collaboration, develop investment opportunities for large, medium and small investors and facilitate investment projects.

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