



**UGC SPONSORED MINOR RESEARCH PROJECT ON
A CRITICAL EVALUATION OF NEW AND RENEWABLE ENERGY
SOURCES IN KARNATAKA STATE WITH SPECIAL REFERENCE
TO WIND ENERGY**

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EXECUTIVE SUMMARY

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Introduction

Energy is one of the most important building blocks in human escalation, and, as such, force as a key indicator in determining the economic growth and development of country. In an effort to meet the demands of a developing nation, the Indian energy sector has witnessed a rapid growth. The development of wind power in India began in the 1990s, and has progressed steadily in the last few years. The short gestation periods for installing wind turbines, and the increasing reliability and performance of wind energy machines have made wind power a favored choice for capacity addition in India. Currently, India has the fifth largest installed wind power capacity in the world. Wind power accounts for 6% of India's total installed power capacity, and it generates 1.6% of the country's power.

India has an enormous source of renewable energy resources, and it has one of the largest programs in the world for positioning renewable energy. India is ranked the third most attractive country to invest in renewable energy, after USA and Germany. India ranks as the world's seventh largest energy producing country and fifth largest energy consuming country. The Ministry of New and Renewable Energy (MNRE) has estimated a potential renewable capacity (excluding solar) of almost 90,000 MW out of which 48,500 MW is wind, 15,000 MW is small hydro power and 23,700 MW is bio-power. However, the Centre for Wind Energy Technology (C-WET) has re-assessed India's wind potential as 102 GW. Renewable installed capacity grew by a CAGR of around 23% over the last five years (2007-12).

Wind Power Technology: Wind has considerable amount of kinetic energy when blowing at high speeds (Patel, 1999). This kinetic energy when passing through the blades of the wind turbines is converted into mechanical energy and rotates the wind blades (Burton et al., 2001) and the connected generator, thereby producing electricity. A wind turbine primarily consists of a main tower, blades, nacelle, hub, main shaft, gearbox, bearing and housing, brake, and generator (Spera, 1994). The main tower is 50-100 m high. Generally, three blades made up of Fiber Reinforced Polyester are mounted on the hub, while in the nacelle the major parts are housed. Under normal operating conditions the nacelle would be facing the upstream wind direction (Patel, 1999). The hub connects the gearbox and the blades. Solid high carbon steel bars or cylinders are used as main shaft. The gearbox is used to increase the speed ratio so that

the rotor speed is increased to the rated generator speed (Burton et al., 2001); it is the most critical component and needs regular maintenance.

Karnataka State Wind Energy Scenario: The State of Karnataka is bestowed with good wind energy potential. Among the states in India, Karnataka has one of the highest potentials for renewable energy. Currently, renewable sources are contributing to around 24% of the state's installed capacity. According to the Karnataka Renewable Energy Development Limited (KREDL), wind energy assessment, outlooks for Potential Capacity is 12,950 MW; Installed Capacity;1368 MW and Capacity addition Target stands at 2969 MW and cumulative positions at 4,337 MW. The Karnataka Renewable Energy Development Limited (KREDL) has installed 53 sophisticated wind monitoring stations in the State to study and identify the wind energy potentials. Totalling 428 projects to 1500 MW have been commissioned of 600 projects sanctioned by the government (of 8000 MW). Chikkodi in Belgaum has the highest wind velocity. The districts of Chitradurga and Gadag have a large number of windmills. In fact, Chitradurga alone has 200 wind turbines. Some of the districts in the State having high wind power potential. The districts are Bagalkot, Belgaum, Bellary, Bijapur Chitradurga, Shimoga and Gadag.

Research Methodology

Objectives: The project has the following objectives. (i)To study the growth of wind energy in Karnataka (ii)To discuss the various Government policies on wind energy (iii) To compare the Hydro and wind power generation in Karnataka.

Review of Literature: The study reviewed 34 related literatures from national and international levels published research articles from printed journals and online Journals and various reports from Karnataka Renewable Energy Development Limited (KREDL) Central Electricity Authority (CEA) Centre for Wind Energy Technology (*C-WET*)

Methodology: The present study intensively based on secondary data. The required data have been be collected from various secondary sources viz, Various official publications and annual reports from the Karnataka Electricity Board, Karnataka Renewable Energy Development

Limited (KREDL) Central Electricity Authority (CEA) Centre for Wind Energy Technology (C-WET) and Various research papers (National and International), working papers on renewable energy specially on Wind sector, and different e-resources on renewable energy.

Organization of Chapters

The study report consists of the following chapters schemes

Chapter - I Deals with Introduction, Background of the study, Research Methodology

Chapter -II Discuss about Review of Literature (National & International Reviews)

Chapter -III Reveals the Renewable Energy Sector in Karnataka State.

Chapter -IV Focused on Data Analysis and Interpretation

Chapter -V Covers the findings & Suggestions and Conclusion of the study.

Outcome of the study: The study offers the following recommends for the immense growth and development of the sector:

- Encourage the growth of small scale wind projects by making clear, comprehensive guidelines for the market.
- Effort should be made to develop effective subsidy models to attract more investors on Wind Sector
- Promote revenue/interest subsidy based energy models through appropriate financial and policy support.
- Regulatory and tariff regime to bring more investment wind energy sector in the State.
- Issues like wind power evacuation, land acquisition for exclusive installation and grid integration should be handled with appropriate and technical compliance.
- Capital Expenditure much more as compared to conventional energy sources.
- Sovereignty in the relation to design subsidy structure and involvement of too many agencies should be diminishing.
- More over to make renewable storage cheaper, the transmission technologies have to be highly competitive.
- The study reveals that the moderate fluctuations in the generation of Hydro power.

- The State Government Renewable Energy Policy plays a vital role on efficient and speedily development of Renewable Energy sector especially with Wind Energy sources to achieve its capacity in the vicinity of future phases.
- The major challenge has been faced by this sector is lack of skilled manpower.
- Renewable policy framework efforts may be strengthened in order to encourage an enormous scale-up system of renewable energy so as to claims energyself-sufficiency for long term.

Conclusion

Energy is the most important key contribution to the growth and development of economy. The prosperity and wellbeing of any field is evaluated depending on the energy supply and consumption levels. The new and renewable energy sector has grown significantly and these days' renewable power sector is contributing on more than 11 per cent in the country's installed power generating capacity. The coherent, consistent and enabling policy, legal & regulatory frameworks needed to mainstream in renewable energy especially wind sector. Comprehensive Strategy Plan for Renewable energy on the areas of, Financial Incentives, R & D, Training would allow this (boost up this sector more the renewable energy) sector works better with decentralized generation and distribution as it provides energy security, generates additional employments and also more trustworthy system when compared to the centralized system. It can conclude that, the sector certainly needs a transformation and a revolution in cutting-edge technology, infrastructure and governmental framework. In terms of wind energy potential, Northern dry districts of Karnataka have excellent wind potential. If the sources were properly tapped and utilized it would be help to generate more employment in local districts of the regions.