



WIND ENERGY CONVERSION SYSTEM

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ABSTRACT: *Worldwide energy demand is increasing at a fast rate to meet fast growing economics of developing countries as well as developed countries. Presently the major energy requirements are catered by using conventional sources out of which coal based thermal generation is having major contribution. Considering the rate at which conventional sources are being consumed and their impact on environments it is necessary to adopt alternate energy technologies for sustainable development.*

Out of various renewable energy sources, wind generation is most cost effective in addition to its various advantages. Worldwide the share of wind generation connected to grid is increasing at faster rate and in near future will become one of the major sources of renewable energy. With rapid development of wind power technologies and significant growth of wind power capacity installed worldwide, various wind turbine concepts have been developed. The wind energy conversion system is demanded to be more cost-competitive, so that comparisons of different wind generator systems are necessary. An overview of different wind generator systems and their comparisons are presented. Also Critical Power Quality issues & Problems related with Grid connections are also discussed.

Keywords: Wind farm, Wind generator, Power Quality issues, Grid connection

I. INTRODUCTION

The research and development of modern wind power conversion technology has been going on since 1970s, and the rapid development has been seen from 1990s onwards. The average annual growth rate of wind energy converter installation is around 26.6% during last 10 years. The global

wind generation installed capacity is around 74,223 MW till March 31st 2008. By the end of 2020, which is expected to cross 12, 60,000 MW i.e. 12% of the world's electricity consumption [12].

Wind energy in India came in the early 1980s with the establishment of the Ministry of Non-conventional Energy Sources (MNES), now renamed as Ministry of New and Renewable Energy (MNRE). Its purpose is to encourage a diversification of fuel sources away from the growing demand for coal, oil and gas required to feed the country's rapid economic growth. The Centre for wind Energy Technology (C-WET) first estimated the total potential for wind power in India at around 45,000 MW. This figure was also adopted by the MNRE as the official estimate of the wind power potential in the country. The Indian Wind Turbine Manufacturers Association (IWTMA) estimated the potential to be of the order of 65,000 MW.

Wind electricity installed capacity in India is around 8757.2 MW till March 31st 2008 and gross potential is 45,000 MW. Wind generation installed capacity in Maharashtra state is 1,755.9 MW and a gross potential is 3,650 MW. It ranks 2nd after Tamilnadu having capacity 3,873.4 MW in India. Today India is a major player in the global wind energy [11].

Considering the increasing share of wind generation interfaced to grid it is necessary to study an overall perspective on various types of existing wind generator systems and possible generator configurations, critical power quality issues, problems related with grid connections and some comparisons of different wind generator systems.

II. WIND TURBINE CONCEPTS AND GENERATOR TYPES

Wind turbine concepts and generator types are as follows.

2.1 CLASSIFICATION OF INDUCTION GENERATORS