

Feasibility of Offshore Wind Farm in India

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Abstract - Wind energy is used for various purposes by people since thousands of years around worldwide. India is gifted by the long coast line about 7500 km. India's population is increasing day by day. Hence, the demand of electricity is also increasing, Maximum renewable energy sources should be used, to fulfill this increased demand. For this, offshore wind farm is one of the potential option. Though off shore wind farms are costlier than the onshore wind farms, it has more benefits compared to the onshore wind farms in terms of environmental, economical and production of electricity. The offshore wind farms are therefore becoming popular around the globe. Accordingly, the Government of India is expected to launch the National Wind Energy Mission Board to activate the first project of offshore wind farm in near future. This paper is related to study of feasible places for the installation of offshore wind farms and its effects in India..

Key Words: Wind form, offshore, Information Value Method, Raster data

1.INTRODUCTION

India is the country of population 1.252 billion in 2013 increasing annually at the rate of 1.2%. Of the 1.252 billion population of India, approximately 300 million people have no access to electricity^[1]. Energy shortage up to 11.3% is anticipated for Southern and North Eastern regions of India according to a May 2015 report published by India's Central Electricity Authority^[2]. There is need to generate new electricity to fulfill these demands. There is increase in share of renewable energy sources as new technologies are discovered. Wind energy is one of the most considered energy source which humans are using from thousands of years. Generation of electricity through wind farm is one of the key sources of energy in India. The onshore wind farms require more land. India has total 7600 km of coastline with three sides surrounded by the sea. Offshore wind farms nowadays, because of new technologies and its benefits are globally getting accepted. Over the open water surface the average wind speed is considerably higher which why there is enough wind available for wind turbines. As compared to onshore wind turbines, offshore wind turbines are less obstructive. Though the offshore wind farm works on the same basis as that of onshore wind farms, offshore wind farms are installed on the various types of platforms like gravity base structure, conventional steel jacket structure and floating platforms (mostly preferred). In this paper, the cost and feasibility of offshore structure in India are discussed.

2. Offshore structure- offshore wind farm

The distance of wind farm from the shore inside the sea is directly related with its effect on human societies. The onshore wind farms are already facing the NIMBY opposition. Though the floating platforms don't harm the sea bed, the wind turbines can directly or indirectly affect some sea water habitats. The sea birds can get harm due to wind turbines while flying over that area.

The sea species may get disturbed directly due to the wind turbines in the following sense

- Noise
- Vibration
- Physical Intrusion
- Visual Intrusion
- Interruption of known used routes

Disturbance due to maintenance access during operation
Potential barrier effects.

Seals can only get affected by pile driving operations, No general change in the behavior of seals at sea or on land could be linked to the construction or operation of the wind farm.^[8]

1.1 Case Study

The Vindeby wind farm in Denmark is named as the world's first offshore wind farm, which is constructed in the year 1991. The Vindeby is located in the country Denmark and installed in the Great Belt Sea having GPS latitude 54.96 and GPS longitude 11.13. It has an alternative name as Ravens berg and is spread on area 3 km². The wind turbines are installed in two rows having 5 and 6 turbines in a row respectively

1.2 Track Records and Technical Details

Offshore construction was started in the year 1990 and completed in September 1991. The project cost was estimated 10 million Euro. This project is getting operated by DONG Energy. The whole project was developed by SEAS-NVE Elkraft. These are installed at a distance of 1.5 to 3 km from shore having water depth 2-6 m. The total installed capacity of 11 turbines is 4.95 MW. The technical details of the project are as follows

Nacelle	
Drive Train Type	High speed
Gearbox Ratio:	1:50
Gearbox Stages	3planetary stages, 1 helical stage