Abu Dhabi Polytechnic

Students' Graduation Project Abstract

Department:	Meteorology	**Semester:**	Spring-2022
Project Title:	Study of Wind Energy Potential in UAE Part-2		
Supervisor:	Dr.Nageswara Rao Gantasala		

Abstract:

The UAE's power demand is increasing year after year as a result of population growth, industrialization, and urbanization, leading to greater pollution over time. In order to reduce pollution, alternate renewable power supplies like wind power energy can be used to fulfill this growing need and to reduce global warming caused by the use of conventional resources.

Graduation Project 1 included the study of wind speed characteristics at 4 stations in UAE, Abu Dhabi, Dubai, Fujairah and Ras Al-Khaimah during 2016-2020. While Graduation Project 2 includes the calculation of wind power potential (WPD) using Weibull parameters (k and c) and study of the temporal and spatial variation of WPD in UAE.

In general, the wind speeds are found to be higher (with higher c values) and less variable (with higher values of k) at Abu Dhabi and Dubai when compared to the relatively lower wind speeds (with lower c values) with more variability (with lower k values) at Fujairah and Ras Al-Khaimah during the period of study. It has been observed that the magnitudes of WPD estimated using the Weibull parameters (k and c), which takes the variation of winds into account, are significantly higher than those estimated using the mean observed wind speeds.

In an attempt made to understand the variation of WPD with the Weibull wind assessment parameters k, c and Vmax.E, it has been found that WPD has shown a positive variation with c, as well as with Vmax.E at both 10m and 65m for the four stations. However, as there is only a slight variation of c from one month to another month, the variation of WPD with c is not so significant as that with Vmax.E on monthly basis.

Like wind speeds, there is a significant spatial variation of wind power potential in UAE. For example, among the 4 stations considered in the study, the annual WPD at 65m is observed to be higher in Abu Dhabi and Fujairah with a magnitude around 130 W/m^2, while it is the minimum in Ras Al-Khaimah with a value of 83.41 W/m^2. This spatial variation of the wind speeds and WPD can be explained in terms of topography and the seasonal wind direction, which largely affect the wind speed at each site.