

Green Technologies And Strategies

The Determination Of The Direction Of Wind According To The Years

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Abstract

Renewable energy sources are seen as an important source in meeting the requirement of energy increasing gradually. One of these most outstanding renewable energy sources is the wind energy whose technology and usage develops most rapidly. To be able to make use of the wind energy effectively, it should be cared that the dominant wind speed direction should be open enough in surrounding. In this direction, to benefit from these wind tribunes more effectively the wind measures must be done the montage of these tribunes should also be done taking into consideration of these dominant open directions.

In this study, the wind measurements have been done hourly for five years and consequently the dominant wind direction have been found out as North Northeast (NNE) and East Southeast (ESE). At the same time, it has also been figured out at the end of the study that there is absolutely no change in the direction of the wind where it blows dominantly during these five years. In this direction, it has been seen that there is no effective change in the direction of dominant winds accordingly in years in that area and a year of measurement would be highly enough to determine the dominant wind direction in the area.

Keywords: Renewable energy, wind energy, wind direction, wind tribune, wind speed.

1. INTRODUCTION

Renewable energy resources are seen as an important source with an increasing interest all over the world in covering the energy requirement owing to the fact that the environmental problems increase every other day and the fossile energy sources gradually decrease (Özerdem, 2003). Due to the fossil resources decreasing day by day and the environmental problems increasing , renewable energy resources are met with an increasing interest all over the world and seen as significant sources in meeting the need for energy. The wind energy whose usage and technology develop most quickly among these renewable energy resources comes on top of all (Kose and Ozgur, 2004). When that wind energy is both local source and clean and nature-friendly is taken into consideration, that it has an important part in solving the problems of our day can be seen (Kose, 2004). When

all these factors are taken into account, trying to compensate the needs with renewable energy resources will both reduce the environmental pollution and increase the life span of reserves by limiting the usage amount of fossil resources which have been decreasing every other day. Consequently, research on these matters should continually be strengthened and supported (Aydin, 2008).

In this study, the wind measurements have been done hourly for five years and consequently the dominant wind direction have been found out as North Northeast (NNE) and East Southeast (ESE). At the same time, it has also been figured out at the end of the study that there is absolutely no change in the direction of the wind where it blows dominantly during these five years. In this direction, it has been seen that there is no effective change in the direction of dominant winds accordingly in years in that area and a year of measurement would be highly enough to determine the dominant wind direction in the area.

2. MATERIALS AND METHODS

2.1. Wind Calculations

In order to be able to make correct calculations in a measuring station, the locations of the equipments within the measuring stations and the distance between them are crucial (Ozgur, 2006). These equipments consist of measuring poles, sensors and data storage units. In measuring stations, the ideal height of the upper anemometer should be 30 meters above the ground and 20 meters above the lower anemometer. The direction control apparatus should be placed 1.5 meters lower than the upper anemometer (Sen, 2003).

In order to design, plan and operate the wind energy systems, it is crucial to know all the characteristics of the winds in detail. Long lasting reliable data are necessitated so as to determine the positioning of turbines and the potential of wind energy (Nogay and Taskin, 2000). Wind velocity calculations are the most significant and crucial measurings for determining the annul energy savings, stabilizing the performance and investing the sources of winds (Ackerman and Soder, 2002). In order to benefit from the wind energy efficiently, the detailed reports of the wind characteristics should be provided in a particular location. In order to determine the wind potential of a specific zone, the calculations of the zone mentioned should be provided at least for a whole year. However, A larger period than a year will provide you with more accurate assessments.

2.2. The Situation of the Wind Energy in the Province of Manisa

The distribution of the wind stations among the districts in Manisa is displayed in the figure 1. According to this drawing, the total installed power had reached for 293.80 MW till the October of 2011 in Manisa.

In Turkey, since the January of 2011, 15 wind stations have been installed, reaching an overall of 72 in the whole country. Akres-Akhisar wind station in Bekirler village in Manisa-Akhisar formed by the Best-Karesi Energy Company was opened in 11.09.2011. With the joining of 45 MW installed power in Akhisar into the overall cycle, the installed energy of Turkey has reached 1600 megawatts,

while Turkey's investment has reached 1.6 billion Euros. Manisa forms almost %18.36 of Turkey with its 293.80 MW. And this is a very high proportion.

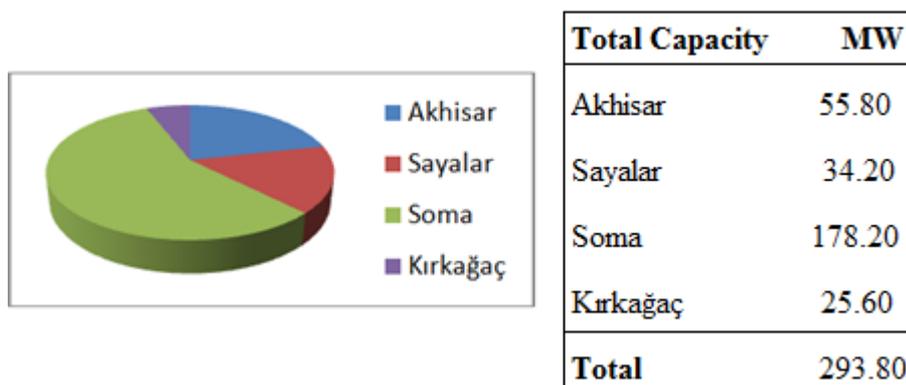


Fig. 1: The distribution of the wind stations among the districts in Manisa (Aydin, 2012)

3. RESULTS

3.1. Measuring the Directions of Dominating Winds in Manisa

Measuring in which directions the winds are moving predominantly is a crucial matter in determining the locations of turbines. As a result of hourly measurements in Manisa for five years, the moving directions and velocity rates of 8760 winds have been stated. These measure rates obtained with the aid of Manisa Region Directorship of Meteorology have been exhibited in Excel and by using this software, it has been possible to determine how many hours, at what directions and velocity the winds have been blowing for a year. These results have been evaluated in Excel and the wind rose displayed in the drawing 'Figure 2-3-4-5' has been acquired. As a result of the wind measuring results conducted in Manisa, the dominating wind direction has been stated as (NNE) North East North and (ESE) East South East. It has been concluded that during the installation of the system, it would be more appropriate to pay attention to leaving this particular direction through which the wind velocity is predominant open in order to benefit more from the turbine.

In this direction, it has been seen that there is no effective change in the direction of dominant winds accordingly in years in that area and a year of measurement would be highly enough to determine the dominant wind direction in the area.

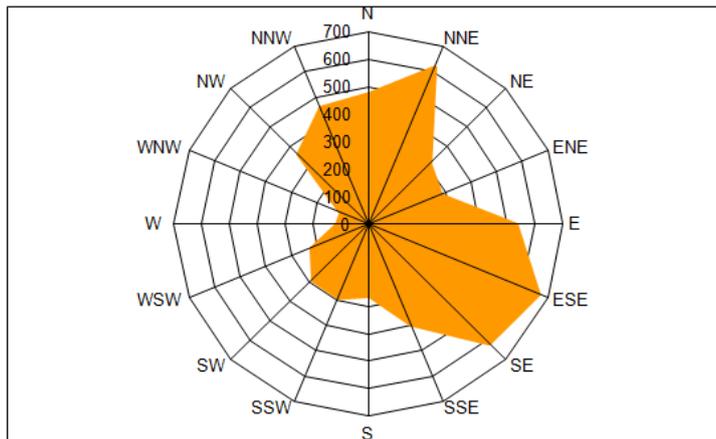


Fig. 2: Wind Rose(2005)

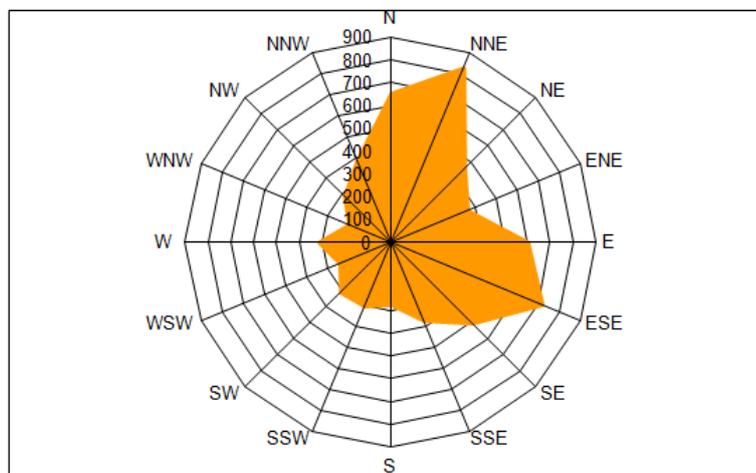


Fig. 3: Wind Rose (2006)

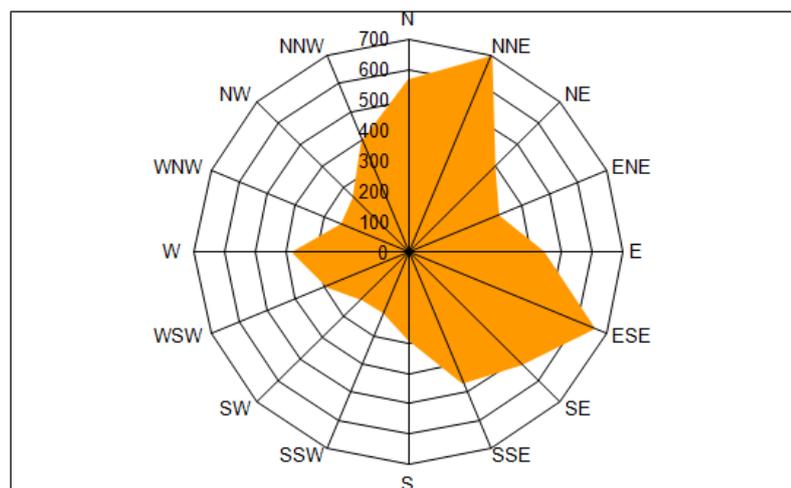


Fig. 4: Wind Rose (2007)

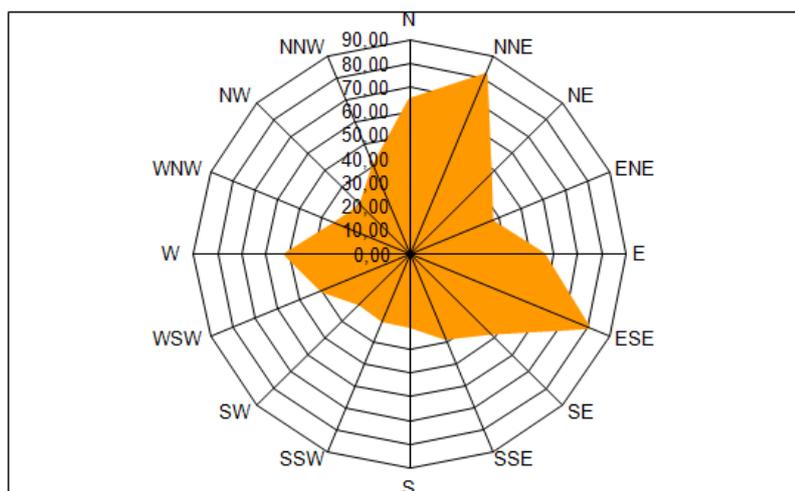


Fig. 5: Wind Rose (2008) (Aydin, 2012)

4. CONCLUSION

In this study, the wind measurements have been done hourly for five years and consequently the dominant wind direction have been found out as North Northeast (NNE) and East Southeast (ESE). At the same time, it has also been figured out at the end of the study that there is absolutely no change in the direction of the wind where it blows dominantly during these five years. In this direction, it has been seen that there is no effective change in the direction of dominant winds accordingly in years in that area and a year of measurement would be highly enough to determine the dominant wind direction in the area.

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