A STUDY OF WIND-POWER AVAILABILITY IN KENYA

BY

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SUMMARY

In order to determine what geographical areas are best suited for exploitation of wind power, speed distributions on monthly and annual basis were computed for some meteorological stations. Correction for local density-altitude was made for each station to compute power. Smoothing was applied in preparing the mean maps since there was a considerable scatter in the results between nearby stations. In general, all stations in Kenya have wind speeds greater than 2 $msec^{-1}$ throughout the year, and do not exceed 6 $msec^{-1}$. Only two districts, Equator and Eldoret do have winds greater than 6 $msec^{-1}$ in some months of the year. Another dominant feature is a high extending SE-NW from the coast through the Eastern, North-Eastern and the northern Rift Valley provinces, with speed exceeding 5 $msec^{-1}$. The rest of the country shows wind speeds generally less than 4 $msec^{-1}$, the lowest wind speeds being less than 3 $msec^{-1}$ around Lake Victoria districts.

The annual power pattern shows a high extending south-north with its centre exceeding 80 watts per square meter around Isiolo districts in the Eastern province, a high in the Coastal districts exceeding 90 watts per square metre and low value of power in the Central, Rift Valley and Nyanza provinces.

A windmill, 24 /feet in diameter, having 8 sails was exposed at a height 20 /feet above the ground in a student's experimental plots at Kabete Agricultural Field Station. The windmill, its

tower for installation was designed by the University of Nairobi, Mechanical engineering Department. A rope was wound around the wind drum to measure the power transmitted when the rotor begins to rotate. In the vicinity a meteorological tower was used to measure the wind speed.

This windmill begins to rotate when the wind speed is about 1.8 $msec^{-1}$. The mean value of the rotor speed during the period of the experiment was 0.26 revolutions per second. The power developed varied from 5.0 to 115.0 watts. The optimum power coefficient of the machine ranges from 0.20 to 0.25 .