# QUESTION 3

The wind speed data provided was at 10m hub height. To obtain useful wind speed data, the log law was used to convert wind speed from 10m to wind speeds at 78m hub height.

Log law:

$$V = V_{ref} \cdot \frac{\ln(z) - \ln(z_0)}{\ln(z_{ref}) - \ln(z_0)}$$

v :Wind Speed at 78m
$v_{ref}$ :Reference Wind Speed (10m)
z :Hub Height (78m)
$z_{ref}$ :Reference Height (10m_
$z_0$ :Roughness Length

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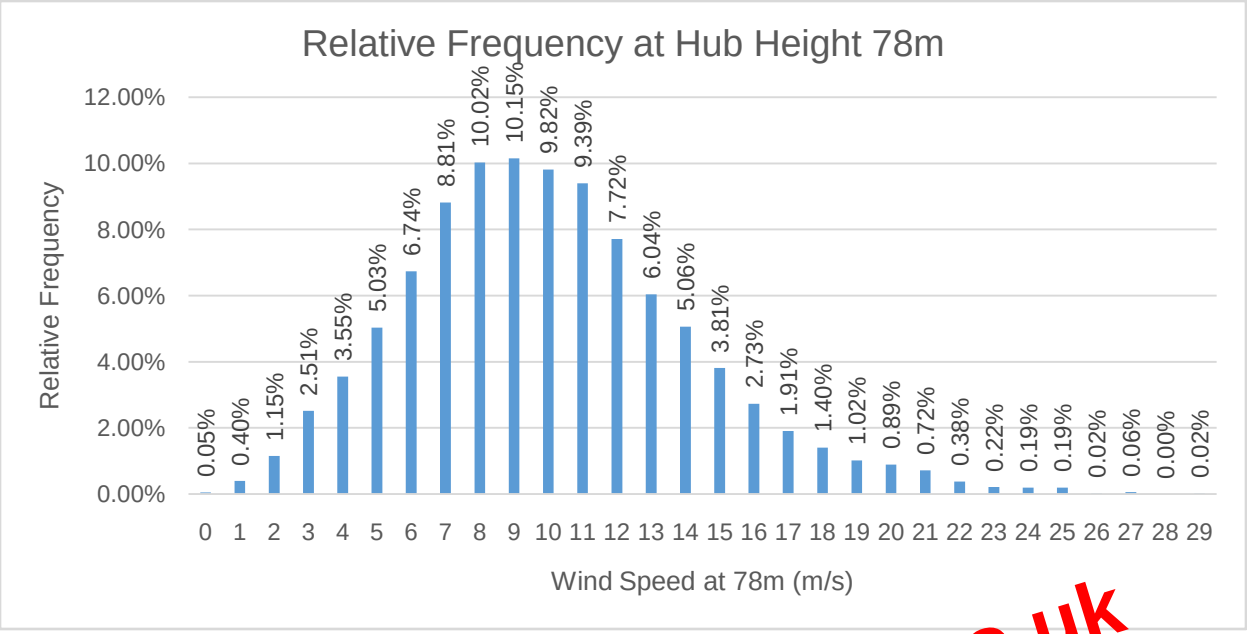
Example:

$$\frac{\ln(z) - \ln(z_0)}{\ln(z_{ref}) - \ln(z_0)} = \frac{\ln(78) - \ln(0.01)}{\ln(10) - \ln(0.01)} = 1.297$$

$$V = 0.52 \times 1.297 = 0.67444\ {}^{m}/_{s}$$

Histogram for Relative Frequency at Hub Height 78m

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# QUESTION 5

The height will change the (scale parameter) as it is related to the average wind speed of the distribution. The shape parameter "k" remains constant.

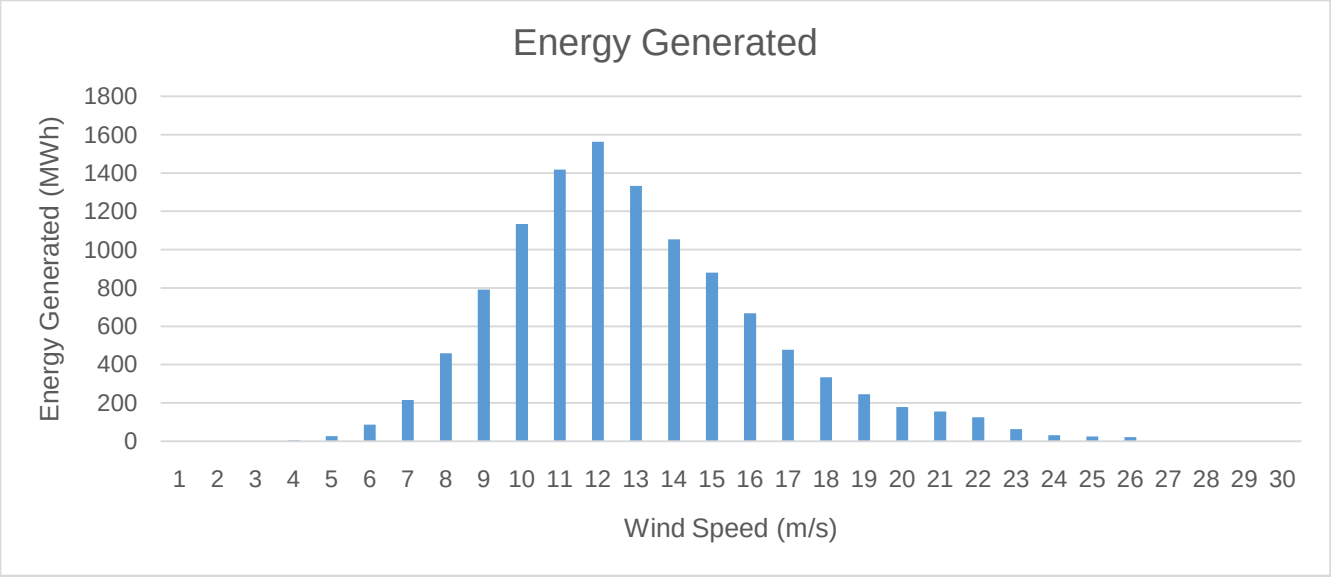
c change as wind gradient:

$$c = c_{ref} \cdot \frac{\ln(z) - \ln(z_0)}{\ln(z_{ref}) - \ln(z_0)}$$

Substituting our scale parameter:

$$c = 8.678 \times 1.297 = 11.099$$

Using the new scale parameter the Weibull distribution was found. The results were plotted into a graph and was compared with the relative frequency

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