

Appendix 10.2: Methodology for calculating from different hub heights and standardising hub height wind speed

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Supplementary Guidance Note 4: Wind Shear Equations

a) Standardising from hub height (hh) to 10m

$$v_{10} = v_{hh} * (\text{LN}(10/0.05)/\text{LN}(hh/0.05)) \quad [\text{EQUATION 1}]$$

v_{10} = Standardised 10m wind speed

v_{hh} = Hub height wind speed = 104m

0.05 = Standard ground roughness length which remains constant (fixed)

b) Calculating from different heights

$$v_1 = v_2 * (h_1/h_2)^m \quad [\text{EQUATION 2}]$$

v_1 = wind speed at h_1

v_2 = Wind speed at h_2

h_2 = 10m

m = Wind shear

c) Equation **b** can be re-arranged to determine wind shear exponent 'm' based on known data at two different Met mast heights (80m and 60m). With wind shear calculated this can be applied to the wind speed at higher (differing) height of 80m to determine hub height wind speed (higher hub height being 104m).

$$m = \text{LN}(v_2/v_1) / \text{LN}(h_2/h_1) \quad [\text{EQUATION 3}]$$

The calculations for standardising hub height of 104m was derived using equation **a**

[See following page](#)

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Hub Height	Hub Height m/s	Standardized m/s
Wind turbine	Wind Speed	Wind Speed
dBA values	104m	10m
94	4.0	2.8
94	5.0	3.5
95	6.0	4.2
98.3	7.0	4.9
101.5	8.0	5.5
103.3	9.0	6.2
103.3	10.0	6.9
103.4	11.0	7.6
103.8	12.0	8.3
104.1	13.0	9.0
104.3	14.0	9.7
104.5	15.0	10.4
104.5	16.0	11.1
104.5	17.0	11.8

