Wind Turbine Power Flow Analysis

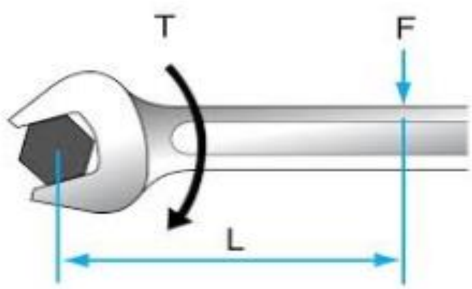
P_W	Potential Wind power
P_M	Potential mechanical power
P_E	Electrical power drawn from the generator
P_S	Net blade shaft power
C_{TM}	Power coefficient mechanical
C_{TE}	Power coefficient electrical

Rotational Power (watts) = Torque(N.m) * Angular velocity (rad/sec)

$P = T\,\omega$

Note: 1 RPM = $2\pi/60$ radian /sec

1 RPM = 0.104 rad./sec



Torque T = F (Force) × L (Length)

L = meters

F = kg* 9.8

Wind turbine blade design determines the values of torque and angular velocity for a a given wind velocity

$P_W \Rightarrow C_{TM} \Rightarrow P_M \Rightarrow P_S \Rightarrow C_{TE} \Rightarrow P_E$

$P_S = P_M - P_E$	$P_S = P_W \cdot C_{TM} - P_E$	$P_E = P_S \cdot C_{TE}$

$P = T\,\omega$

$P_S = T_S\,\omega_s$

Net shaft power will vary with electical loading and Lentz's law