

## Wind Energy

## 風能

9.1 Physical Terms	9.1 物理名詞
<p>9.1.1 Power coefficient The ratio of the mechanical power at the shaft to the power constituted by a given ambient wind velocity across the swept area (see 9.1.17).</p>	<p>9.1.1 動力係數 軸所產生之機械動力與在特定環境同速通過掃動面積所構成之動力比（見 9.1.17）。</p>
<p>9.1.2 Proximity effect Effect whereby the power of a wind turbine is diminished due to the presence of one or more other wind turbines at a given distance as measured from the first turbine.</p>	<p>9.1.2 鄰近效應 從某一部風力機量起，在某一特定距離之另一部或更多部之風力機之存在，而引起該部風力機之動力減弱的效應。</p>
<p>9.1.3 Aerofoil lift The component of the resultant wind force on a blade section in a direction perpendicular to the direction of relative wind velocity.</p>	<p>9.1.3 氣翼上昇 在葉片斷面上與相對風速方向垂直方向上風合力之分力。</p>
<p>9.1.4 Coriolis force The force, within a moving frame of reference, that results from the interaction of a rotational motion and a linear motion. Note In the case of the wind, the following definition applies: The force exerted by the wind in maintaining or attempting to maintain its initial linear velocity when being moved from one latitude to another on the surface of the earth and resulting in tangential and centrifugal acceleration.</p>	<p>9.1.4 柯若利士力 為坐標系內的一種力，係由旋轉運動與線性運動之相互作用而產生的。 (註) 風力方面應使用如下定義：當風在地球表面上某一高度移動至另一高度及產生切線和離心加速度時，為繼續保持或企圖保持其初期線速度所施的力。</p>
<p>9.1.5 Thrust The component of the resultant wind force on a blade section in the direction of movement of the blade section.</p>	<p>9.1.5 推力 葉片斷面上風合力之分力，其方向與葉片斷面之運方向相同。</p>
<p>9.1.6 Aerofoil drag The component of resultant wind force on a blade section in the direction of relative wind velocity.</p>	<p>9.1.6 氣翼拖拉力 葉片斷面上風合力之分力，其方向與相對風速之方向相同。</p>
<p>9.1.7 Normal force The component of the resultant wind force on a blade section perpendicular to the blade section chord.</p>	<p>9.1.7 正交力 葉片斷面上風合力之分力，其方向與葉片斷面位之方向垂直。</p>
<p>9.1.8 Isovent Line of constant average wind velocity.</p>	<p>9.1.8 等風口 等平均風速之線徑。 (註) 當測定等風口時使用之標準狀況需</p>

<p>Note The standard conditions applied when determining the isovent must be specified.</p> <p>9.1.9 Betz's Law For the case of an ideal wind turbine rotor having a swept area A. the theoretical maximum power output with ambient wind velocity <math>V_{\infty}</math>(see 9.1.17) is:  <math>8/7\rho AV_{\infty}^3</math>  where <math>\rho</math> is the density of the air.  Note The kinetic energy KE available in an air stream is given by:  <math>KE=1/2\rho AV_{\infty}^3</math>  The ratio of the useful power output P at the wind turbine shaft to the theoretically available power KE is termed the power coefficient <math>c_p</math>(or efficiency <math>\eta</math>):</p> $C_p = \frac{P}{KE}$ <p>The maximum value of</p> $C_p \text{ is } \frac{16}{27}$ <p>9.1.10 Wind pressure: velocity pressure The force per unit area exerted by the wind at a given location measured upon a surface perpendicular to the direction of the wind.</p> <p>9.1.11 Tip velocity ratio The ratio of the maximum tangential velocity of the blade tip to the ambient wind velocity.  Note Knowledge of this ratio enables comparisons to be made between different types of windmills.</p> <p>9.1.12 Betz's efficiency The ratio of the power output at the wind turbine shaft to the theoretical maximum power available as calculated according to Betz's law (see 9.1.9).</p> <p>9.1.13 Swept area The projection on to a plane perpendicular to the direction of the</p>	<p>加以註明。</p> <p>9.1.9 貝茲法則 對一理想風力機而言，轉子具有一掃動面積A，在周遭風速<math>V_{\infty}</math>下之最大輸出動力理論值（見9.1.17）為：  <math>8/27 \rho AV_{\infty}^3</math>  其中<math>\rho</math>為空氣密度。  （註）空氣系統之有效動能（KE）為：  <math>KE=1/2 \rho AV_{\infty}^3</math>  風力機軸產生之有用輸出動力與理論有效動力KE之比例式為動力係數<math>C_p</math>（或效率<math>\eta</math>）：  <math>C_p =</math>  <math display="block">C_p = \frac{P}{KE}</math>  <math>C_p</math>之最大值為 16/27。</p> <p>9.1.10 風壓；速度壓 在某物定位置，於垂直於風向表面上測得之單位面積所承受之風力。</p> <p>9.1.11 尖速比 葉片尖端之最大切線速度與週遭風速之比值。  （註）此種比率之經驗可使用於不同種類間風力機之比較。</p> <p>9.1.12 貝茲效率 風力機軸之輸出動力與由貝茲法則（見9.1.9）所計算而得之最大理論有效功之比。</p> <p>9.1.13 截風面積 附於轉子上之旋轉物體於與週遭風向垂直之平面上之投影。</p>
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<p>ambient wind of the body of revolution described by the rotor.</p> <p>9.1.14 Cut-in wind velocity The wind speed referred to a specific blade-tip velocity in the case of a specific turbine, at which the wind turbine starts supplying useful output power at the shaft.</p> <p>9.1.15 Cut-off wind velocity The wind speed, referred to a specific blade-tip velocity in the case of a specific turbine, above which the wind turbine ceases to produce useful output power at the shaft.</p> <p>9.1.16 cut-out wind velocity: furling speed The wind velocity at which the protective device fitted to a wind turbine is actuated to prevent mechanical damage to the machine.</p> <p>9.1.17 Ambient wind velocity The wind velocity in front of the wind turbine and not disturbed by it.</p> <p>9.1.18 Rated wind speed: optimum ambient wind velocity The ambient wind velocity at which maximum power output is developed per unit area swept by the turbine rotor.</p> <p>9.1.19 Geostrophic wind Wind resulting solely from pressure gradients and Coriolis forces.</p>	<p>9.1.14 啟動風速 對一特定風力機能夠開始供應有用的輸出軸動力時，此風力機葉片尖端之速度。</p> <p>9.1.15 啟斷風速 對一特定風力機而言，葉片尖端之速度達到此速度時，風力機停止產生有用的輸出軸動力。</p> <p>9.1.16 最大承受風速；摺起速度 風力機上所裝設之保護裝置能真正發生防止機器受到機械損害功同時之風速。</p> <p>9.1.17 周遭風速 在風力機前端而不受風力機擾亂之風速。</p> <p>9.1.18 額定風速；最適合周遭風速 為一週遭風速，在此風速下風力機所掃動之單位面積之輸出動力為最大。</p> <p>9.1.19 地轉風 單獨由壓力梯度和柯若利士力所產生的風。</p>
<p>9.2 Technology</p>	<p>9.2 術語</p>
<p>9.2.1 Aerogenerator An installation in which the rotor of a wind turbine is coupled to an electric generator.</p> <p>Note Aerogenerators can have applications where low and medium power supply is required, particularly in remote locations.</p> <p>9.2.2 Wind turbine; windmill A device for converting wind energy into mechanical energy.</p> <p>Note Applications for windmills are predominantly those in which a local stationary source of mechanical or</p>	<p>9.2.1 氣力發電機 為一種風力機之轉子與發電機結合的裝置。</p> <p>(註)氣力發電機可應用在需要中小量電力之地方，特別是在偏遠地區。</p> <p>9.2.2 風力機；風車 一種將風能轉換成機械能的裝置。</p> <p>(註)風車應用於需要固定之電力或機械動力之地方非常有利，但見 9.2.1 之氣力發電機。</p>

<p>electrical power is required; but see aerogenerators, 9.2.1.</p>	
<p>9.2.3 Blade The component of a wind turbine rotor that is driven by the wind, thus producing a useful torque at the rotor shaft by aerodynamic forces. Note The terms vane and sail are often employed to describe specific types of blade.</p>	<p>9.2.3 葉片 風力機轉子上之元件，其為風所驅動，藉著空氣動力而在轉子軸上產生有用之轉矩。 (註)帆及翼板為經常用來描述葉片特殊型式的名詞。</p>
<p>9.2.4 Radius of a blade section The distance between the aerodynamic centre of the particular blade section and the axis of rotation, measured in the plane perpendicular to the axis of rotation. Note The aerodynamic centre and geometric centre are frequently the same.</p>	<p>9.2.4 葉片截面半徑 於垂直於轉動軸之平面上測得之特殊葉片部份之氣體動力學中心與轉動軸之距離。 (註)氣體動力學中心與幾何中心經常是相同的。</p>
<p>9.2.5 Tip radius; blade radius Distance between the centre of the blade section at the tip and the axis of rotation, measured in the plane perpendicular to the axis of rotation.</p>	<p>9.2.5 葉尖半徑；葉半徑 於垂直於轉動軸之平面上測得葉片部份尖端之中心與轉動軸之距離。</p>
<p>9.2.6 Height diameter ratio of a VAWT The ratio of the projection of a blade perpendicularly on to the axis of rotation to twice the blade or tip radius.</p>	<p>9.2.6 VAWT 之高直徑比 葉片在轉軸上之垂直投影與二倍之葉片半徑之比。</p>
<p>9.2.7 Darrieus rotor; Darrieus wind turbine A rotor or turbine with a vertical, or cross wind, axis usually incorporating two or three fixed pitch aerofoil blades of low solidity.</p>	<p>9.2.7 打蛋形轉子；打蛋形風力機 具有垂直或交叉式風軸之轉子或風力機，而軸上通常裝有二片或三片固定距低固性之氣翼葉片。</p>
<p>9.2.8 Savonius rotor; Savonius wind turbine A rotor or turbine usually comprising two offset semi-cylindrical blades or vanes rotating about a vertical or cross wind axis.</p>	<p>9.2.8 桶形轉子；桶形風力機 通常為由二個偏位半圓筒狀葉片或帆組成繞著垂直或交叉式風軸轉動之轉子或風力機。</p>
<p>9.2.9 Solidity The ratio of the area covered by blading to the swept area (see 9.1.13), or the ratio of the size of blading to the overall rotor size. Note The above is a generalised definition.</p>	<p>9.2.9 固性 葉片所覆蓋之面積與截風面積（見 9.1.13）之比，或葉片之大小與整個轉子大小之比。 (註)上述為一般性的定義，若考慮某一形式之風力機宜有精確的定義。</p>

<p>More precise definitions would have to be specific to the type of wind machine under consideration.</p>	
<p>9.2.10 Shrouded/augmented rotors or turbines Rotors of wind turbines equipped with means to direct the air-stream artificially across the swept area.</p>	<p>9.2.10 桅牽索／擴大式轉子或風力機 裝置來用以直接將空氣人工化流通過截風面積之風力機轉子。</p>
<p>9.2.11 Vertical axis wind turbine (VAWT) A wind turbine or rotor with a vertical, or cross wind, axis, e.g. Darrieus or Savonius types.</p>	<p>9.2.11 垂直軸風力 (VAWT) 具有垂直式或交叉式風軸之風力機或轉子，即打蛋形或桶形者。</p>
<p>9.2.12 Horizontal axis wind turbine (HAWT) A wind turbine or rotor with a horizontal axis, e.g. an airscrew.</p>	<p>9.2.12 水平軸式風力機 (HAWT) 具有水平軸之風力機或轉子，即螺旋槳式。</p>
<p>9.2.13 Rotor wake The zone behind the wind turbine, in relation to wind direction, in which the wind turbine has disturbed the ambient wind velocity.</p>	<p>9.2.13 轉子尾流 風力機後面之區域，與風向有關，在此區域內之風速將乃風力機所擾亂。</p>