

EAGLE POWER

**TECHNICAL REPORT
FOR USE AS
BACKGROUND MATERIAL
TO ACCOMPANY
PLANNING APPLICATION**

FOR

A PROVEN WIND TURBINE

2011

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Eagle Power is a trading name of Gumbley & Company Limited, a limited company number 1644240 at the above registered office
Company Registration no. 1644240 VAT Registration No GB 361 5805 55



NAP 12745



PROVEN WIND TURBINES

INTRODUCTION

Proven Energy's is the world's leading supplier of small wind turbines. The high performance of its turbines is the result of over 30 years of inspiration, innovation and development. With more than 3000 units installed worldwide, proven Energy have unrivalled experience and have built up a global reputation for their robust and reliable performance producing energy under the harshest of conditions.

The main attributes of the Proven wind turbine are that they are considered to be: robust, well designed, have low noise emission and a low maintenance regime.

Robust

Proven Energy provides the world's only robust, low maintenance turbine. Their internationally patented turbine has undergone extensive testing under the most rigorous of climate conditions. Proven Energy's installations operate successfully throughout the world, from Antarctica to Saudi Arabia.

Unlike upwind turbines, the system works with nature and not against it by getting the most out of any wind speed, helping to maximise your investment.

Design

The patented Proven Flexible Blade System enables the turbine to generate power in light or strong winds. This unique system, a combination of innovative design and the latest techniques in advanced composite technology, allows the blades to bend and flex.

As the wind gets stronger, the blades twist to reduce their aerodynamic efficiency. This allows the wind turbine to maintain a high output even in the fiercest storms, unlike many other turbines, which need to stop generating power to protect themselves at high wind speeds. The blades also regulate their speed, preventing damage if the load from the turbine is disconnected through a power cut or electrical fault.

Low Noise

A Proven Energy turbine is designed to minimise noise and maintenance. It has a direct drive generator, which operates without a gearbox. The generator load is continuously monitored to keep the blades rotating at a low speed, whilst optimising power output.

Compared with other modern small turbines, the blade tip speed of a Proven Energy turbine is low. This means that noise is reduced substantially.

Low Maintenance

Proven turbines are designed to run with the minimum of maintenance.

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Applications

Eagle Power considers the Proven wind turbine represents the right system to meet the applicant's needs. They also support the intended location for the turbine based on wind speed survey assessment work undertaken in the locality.

The Proven Energy product ensures it can help achieve renewable energy aspirations by reducing domestic energy bills. It is also confident that the wind turbine selected will work productively and deliver all round environmental benefits.

If a property is not connected to the grid, energy from a wind turbine can be used to supply electricity via a battery storage system. This reduces the reliance on diesel generators, which are expensive to run and damaging to the environment.

Where a property is already connected to mains, renewable energy can be used directly and surplus exported back to the grid.

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MODELS OF PROVEN WIND TURBINES

Proven manufacture and supply models with different outputs, mast heights and blade diameters.

PROVEN P7

<p>ROTOR</p> <p>TYPE: Downwind, 360 degrees free yawing SPEED CONTROL: Self-regulating BLADES: 3 blades, passive coning and pitch control ROTOR DIAMETER: 3.5m RATED SPEED: 300 rpm @ 12m/s RATED POWER: 2.5kW @ 11m/s</p>	<p>WEIGHTS</p> <p>TURBINE HEAD: 190kg TOWER: 284kg (6.5m) TOWER: 520kg (11m)</p>
<p>GENERATOR</p> <p>TYPE: Brushless permanent magnet, direct drive OUTPUT: Grid connect 300V, battery charging 24/48/120V, direct heating 240V switch DC</p>	<p>SOUND EMISSION</p> <p>Ongoing testing - data not yet available.</p>
<p>TOWERS</p> <p>TYPE: Self-supporting hinged monopole HUB HEIGHT: 6.5m or 11m</p>	<p>PERFORMANCE</p> <p>CUT-IN WIND SPEED: 3.5m/s MAX WIND SPEED (survival): 70m/s ESTIMATED ANNUAL YIELD: 4,655kWh @ 5m/s</p>
<p>FOUNDATIONS</p> <p>2.50m x 2.50m x 1.00m (11m tower) 1.60m x 1.60m x 1.00m (6.5m tower)</p>	<p>BUILD MATERIALS AND COLOURS</p> <p>FRAME: Galvanised steel, grey BLADES: Glass thermoplastic composite, black or white COVERS: Plastic, black or white TOWERS: Galvanised steel, grey</p>

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PROVEN P11

<p>ROTOR</p> <p>TYPE: Downwind, 360 degrees free yawing SPEED CONTROL: Self-regulating BLADES: 3 blades, passive coning and pitch control ROTOR DIAMETER: 5.5m RATED SPEED: 200 rpm @ 12m/s RATED POWER: 6kW @ 11m/s</p>	<p>WEIGHT</p> <p>TURBINE HEAD: 600kg TOWER: 453kg (9m) TOWER: 976kg (15m)</p>
<p>GENERATOR</p> <p>TYPE: Brushless permanent magnet, direct drive OUTPUT: Grid connect 300V, battery charging 48/120V, direct heating 240V switch DC</p>	<p>SOUND EMISSION</p> <p>See separate report Sgurr Energy Ltd April 2007</p>
<p>TOWERS</p> <p>TYPE: Self-supporting hinged monopole HUB HEIGHT: 9m or 15m</p>	<p>PERFORMANCE</p> <p>CUT-IN WIND SPEED: 3.5m/s MAX WIND SPEED (survival): 70m/s ESTIMATED ANNUAL YIELD: 7,800 kWh @5m/s</p>
<p>FOUNDATIONS</p> <p>3.00m x 3.00m x 1.20m (15m tower) 2.5m x 2.5m x 1.00m (9m tower)</p>	<p>BUILD MATERIALS AND COLOURS</p> <p>FRAME: Galvanised steel, grey BLADES: Glass thermoplastic composite, black or white COVERS: Plastic, black or white TOWERS: Galvanised steel, grey</p>

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PROVEN P35-2
Fully MCS Certified December 2010

<p>ROTOR</p> <p>TYPE: Downwind, 360 degrees free yawing SPEED CONTROL: Self-regulating BLADES: 3 blades, passive coning and pitch control ROTOR DIAMETER: 8.5m RATED SPEED: 140 rpm @ 12m/s RATED POWER: 12.1kW @ 11m/s</p>	<p>WEIGHT</p> <p>TURBINE HEAD: 1300kg TOWER: 1519kg (15m)</p>
<p>GENERATOR</p> <p>TYPE: Brushless permanent magnet, direct drive OUTPUT: Grid connect 300V, battery charging 48/120V, direct heating 240V switch DC</p>	<p>SOUND EMISSION</p> <p>See separate report Hayes McKenzie Partnership September 2010</p>
<p>TOWERS</p> <p>TYPE: Self-supporting hinged monopole HUB HEIGHT: 15m</p>	<p>PERFORMANCE</p> <p>CUT-IN WIND SPEED: 3.5m/s MAX WIND SPEED (survival): 54m/s ESTIMATED ANNUAL YIELD: 23,200 kWh @5m/s</p>
<p>FOUNDATIONS</p> <p>3.70m x 3.70m x 1.20m (15m tower)</p>	<p>BUILD MATERIALS AND COLOURS</p> <p>FRAME: Galvanised steel, grey BLADES: Glass thermoplastic composite, black or white COVERS: Plastic, black or white TOWERS: Galvanised steel, grey</p>

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Masts

Each is of a tapered monopole design with no guy wires. They are constructed from hot dip galvanized steel to guarantee durability.

- Proven P7 - 6.5m (21ft) or 11m (35ft)
- Proven P11 - 9m (30ft) or 15m (49ft)
- Proven P35-2 - 15m (49ft)



Relative size of the wind turbines

From left to right: P7/6.5m mast, P11/9m mast, man of 2m height, P35-2/15m mast

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Wind Energy Systems

All Proven Energy turbines are available in three standard systems, which manage the use of the electricity generated:

1) **Grid Connection**

Electricity from the wind turbine is fed directly into the distribution board, providing power to the premises. Any surplus electricity produced may be exported to the grid and sold to the energy supplier.

2) **Battery Charging**

Energy produced by the turbine is stored in a battery to provide a power supply. This is appropriate for those which are not connected to the grid and which rely on a diesel generator. Installing a wind turbine can substantially reduce fuel consumption and benefit the environment by reducing CO2 emissions.

3) **Direct Heating**

Energy produced by the turbine is directed to hot water tanks, storage heaters or under-floor heating, rather than providing electricity to feed into the power supply. This can substantially reduce CO2 emissions produced by oil or gas heating systems.

A wind turbine should be located on a site with good exposure to the prevailing wind, ideally away from buildings and trees to avoid turbulence, which can severely reduce the output. Wind speed increases and turbulence reduces with height. In certain circumstances, there may be a compromise between obtaining optimal output from the turbine and the effect on the visual amenity, although this can be mitigated by our ability to paint the mast to blend in with the background.

The specific turbine being applied for and its design specifications are included with the planning application now submitted. This technical report, together with other associated documents, should be read together as they provide complementary information to help the Council give positive consideration to the proposal.

FURTHER INFORMATION AND ASSISTANCE

If further information is required please do not hesitate to contact the office.

Eagle Power

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