



EcoEnergy Group Ltd

Renewable Energy Proposal Glasgow Science Centre

October 2008

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THE PROPOSITION

Company Focus	Our investment activities are focused on the renewable energy generation sector, associated sustainable energy projects & carbon offset ventures
Project	Development & installation of one wind turbine
Geographic Focus	Glasgow Science Centre, Glasgow, UK
Project Size	3MW
Construction	Operational by 2010
Investment	£4m

EcoEnergy is perfectly placed to deliver exceptional & sustainable, emission-free renewable energy projects.

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RENEWABLE POWER GENERATION



WIND POWER

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Project Overview

Summary

The proposal is for the development of a new wind turbine facility based at the Glasgow Science Centre (GSC), with an installed capacity of 3MW.

Large scale wind turbines are an efficient energy recovery process that utilises a locations' wind resource and creates renewable electricity.

The energy can be captured and used for the benefit of local communities, commercial premises or businesses and, as it does not come from fossil fuel sources & is readily available, the energy is carbon neutral.

Project Benefits

The installation of the proposed wind turbine will bring many benefits to the GSC, Glasgow City and the wider environment.

Wind energy is an environmentally sound and sustainable energy source which helps reduce dependency on fossil fuel sources of power, reduces air pollution & greenhouse gas emissions and generates 100% renewable electricity 24/7, 365 days per year.

Wind turbine developments not only create employment but they can be used to safeguard existing jobs and provide a more stable and secure future for businesses and enterprises.

Renewable Energy

In September 2007 the British Wind Energy Association ("BWEA") published their report 'Countdown to meeting the 10% UK renewable electricity target by 2010' which showed that there is an energy market requirement for and a shortage of renewable energy being generated in the UK.

Currently, electricity generated from renewable sources provides just over 4.5% of the UK's total electricity supply requirement.

The report states that the rate of installation of new renewable generation capacity is behind target, and needs to more than double by 2010 to meet the 10% renewable energy target for the UK.

The BWEA also predicts that onshore wind needs to account for almost half of this 10% target, given limiting factors associated with other technologies.

For onshore wind, this equates to a target of approximately 6,000 megawatts of total installed capacity. However, the UK currently has just over 2,400 megawatts of onshore wind capacity installed and operational.

In Scotland, the renewable energy target is actually much higher at 31% by 2011 and 50% by 2020, while the amount of electricity generated from renewable sources at present (Scottish Government Study 2000 – 2006) is only 16.3%

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Project Overview

Energy Generation

Electricity generated by wind turbines will be further in demand due to the fact that many UK power generation plant operations will be restricted under the EU Large Combustion Directive (LCP).

This places strict limits on the SO_x, NO_x and particulate emissions of power stations from 2008 and qualifying plants have the right to opt into or out of the LCP Directive. Those plants that opt out will be restricted to 20,000 hours of operation in total from 2008, with enforced closure by the end of 2015.

Wind Turbine Design & Layout

The proposal is for the development of a new wind turbine facility based at the Glasgow Science Centre, with an installed capacity of 3MW.

The wind turbine structure will be in keeping and scale to the existing GSC building & tower and will measure approx 125m in height.

Modern wind turbines are extremely efficient and quiet. The operational turbine will produce only 35-45 decibels of noise at a distance of 350m. This is less than the noise produced by a car moving at 40mph at 100m distance.

Full technical specifications of the recommended wind turbine are attached and indicative images are shown below:



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Project Overview



The turbine will be installed, operated and managed by EcoEnergy and will meet all UK & European Legislation.

Energy Output

The proposal has been designed to install one 3MW freestanding wind turbine.

Under anticipated site operating conditions, due to scheduled and unscheduled maintenance & downtime, the turbine would be available to generate energy for approx 8,000 hours per annum and be operationally efficient 27% of this period.

This equates to net energy generated of 6480MWh per annum.

Project Process & Timeline

In order for a renewable energy project to become operational, a complete set of procedures must be finalised, which include investigation into the relevant factors, gathering supporting information, achieving planning consent and construction of the resource.

Anticipated preparation and construction timescales will be approximately 21 months, with the turbine at GSC expected to be operational by the third quarter 2010.

<u>Process</u>	<u>Timeline</u>	<u>Costs</u>
Pre-feasibility	3 months	£10,000
Feasibility studies	6 -12 months	£115,000
Detailed Design & Planning	9 -18 months	£30,000
Construction Scheduling	3 -12 months	£20,000
Electricity Generation starts	21 months +	£175,000

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Project Overview

Pre-Feasibility

A pre-feasibility study determines whether there is a possibility of development. Areas of investigation must encompass contacting, enquiring and liaising with all relevant stakeholders both locally & nationally.

Feasibility Study

The aim of the feasibility study is to detail relevant aspects of the pre-construction process and to also create a forward looking checklist for the project as a whole. The full feasibility study process includes full analysis of any concerns raised in the pre-feasibility and other such applicable tasks.

Detailed Design & Planning

This stage involves the responsibility to project manage the process for the detailed surveys and design of the turbine installation & the planning application submission.

Construction Scheduling

A successful application signals the start of the construction phase of the project.

This final stage involves planning the phased task of installing and connecting any renewable energy resource.

At the end of this construction & installation process, the renewable energy facility will be online & generating sustainable electricity.

EcoEnergy Group Overview

Objectives & Aims

EcoEnergy focuses on investing in sustainable & renewable energy generation projects in the UK & Europe. We back high growth, reliable clean technology projects, or companies, who contribute to a lower carbon economy and a more sustainable environment, yet generate and maximise income & asset values.

The EcoEnergy investment objective is to generate long-term sustainable growth through investment of funds into a diverse portfolio of renewable energy generation projects, companies or ventures.

Our Vision

EcoEnergy has established itself as a specialised investment group focused on the investment opportunities created by the transition towards the low carbon/renewable global economy. Our vision is to reconcile environmental responsibility without compromising investment discipline, project focus and accountability.

EcoEnergy invests in renewable energy schemes ranging from 50KW to 100MW, with planning permission. Given the target project size, most investments are in projects too small to be of interest to the large development companies, major utilities and larger investment funds. Generally these are projects that have been initiated by small-scale developers, land-owners, community groups or on industrial sites.

Our Method

EcoEnergy independently and internally evaluate each proposition and aim to mitigate risks. We only progress with presented opportunities when we are in the position to add value to a project and that meet our sustainable criteria.

Keeping our goals and priorities in mind, we act both professionally, ethically and efficiently in our pursuit of sustainable success.

EcoEnergy will continue to identify and negotiate potential investment opportunities and seek contractually commitments to invest in and / or sign exclusivity agreements for new sustainable energy projects from both on & off market sources.

Core Activities

EcoEnergy invests capital into high growth, reliable clean power/energy technology areas of renewable energy including:

- wind
- biomass
- hydro
- solar
- energy from waste

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EcoEnergy Group Overview

Investment Strategy

Our investment strategy is to develop a portfolio of renewable energy-related assets that provide superior returns with consistent & proven capital appreciation.

EcoEnergy has developed, and will continue to develop and maintain, strong relationships with major industry participants, including developers, lenders, utilities, investment bankers, lawyers, consultants, engineering firms, and others who are excellent sources of potential investment opportunities.

The team aims to deliver long-term performance by investing in projects with positive growth, supported by trends in environmental and social policies & regulations.

EcoEnergy seeks to invest in energy generating projects & assets that provide opportunities through improved operating performance, project expansions, plant enhancements and repowering.

Primary strategies include:

- Identifying & developing renewable energy generation assets
- Unlocking value embedded in undervalued utility and generation assets
- Owning significant equity positions in projects / generation companies
- Diversifying through allocation of investment capital by geography, location, technology, fuel type, stage of investment & type of investment

Major Investment Criteria

The principal investment focus is on operating assets utilising commercially proven technologies that generate electricity or other consumable energy products produced from renewable energy sources.

We also consider opportunities where we do not hold majority shareholding in assets, but that meet our risk and return requirements. Through this process, we ensure that we obtain key management representation, active management roles, and voting rights so to influence all issues critical to an asset's performance and value.

Underlying criteria to achieve our principles include:

- Potential to deliver 50kW - 100MW renewable energy assets
- High energy demand both residentially & commercially
- A convincing business model with realistic growth prospects

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Current Investment Projects

<u>Project name</u>	<u>Resource</u>	<u>Details</u>	<u>Total Project Investment</u>
Streetlight, UK	Wind	15MW	£20m
Cell Mast, UK	Wind	100MW	£120m
ComProp	Wind	15MW	£18m
Waste Plan	EfW	25MW	£215m

[Streetlight, Glasgow](#)

The Company is finalising contract negotiations for a long term exclusivity agreement with Glasgow City Council in respect of a 15MW wind farm development in Glasgow, Scotland.

As part of the agreed deal, Glasgow City Council is obligated to secure planning consent for this wind farm, as well as an offer for connection to the electricity grid. We are continuing to work with Glasgow City Council and its consultants to secure the contracts necessary to commence construction. The wind farm is expected to be operational and start generating early in 2011.

This project is expected to require an investment of approximately £20m.

[Cell Mast, UK](#)

The Company is finalising contract negotiations for a long term exclusivity agreement with the major mobile phone network operators in respect of utilising existing network mast sites for installation of up to 100MW wind energy facilities throughout the UK.

As part of the agreed deal, the mobile phone operator is obligated to secure planning consent for the wind turbines. Connection to the electricity grid in each circumstance is already established. The wind turbine installations are planned to be installed in phases and expected to be operational and start generating early in 2011.

This project is expected to require an investment of approximately £120m.

[ComProp, Greenock](#)

The Company is in final negotiations for a long term exclusivity agreement with a major manufacturer based in the West of Scotland in respect of utilising its prime wind farm site for installation of up to 15MW of wind turbines.

This project is expected to require an investment of approximately £18m.

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Waste Plan, Inverclyde

EcoEnergy is establishing a new area Energy from Waste plant that utilises domestic and commercial waste and recovers energy and heat from the process with the plant being rated at 25MW.

The project will help to achieve the Scottish Executives target of diverting waste from landfill and is expected to be operational and start generating early in 2011.

This project is expected to require an investment of approximately £215m.

Investment Pipeline

We are actively assessing over 20 investment opportunities developing in excess of 400 megawatts of generating capacity. The Company's investment strategy includes pursuing opportunities with companies developing multi megawatt wind schemes, companies owning existing operational assets and companies seeking planning permission for new schemes.

On the basis of the current rate of investment and an assessment of the potential investments in the pipeline, we are satisfied that sufficient projects are available to fully attain the investment returns in accordance with the investment strategy.

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APPENDIX

Wind Turbine Technical Data

Rated power:	3MW (3,000 kW)
Rotor diameter:	90 m
Hub height:	80 m
Wind class (IEC):	IEC/NVN II
Turbine concept:	Variable speed, variable pitch control
Rotor Type:	Upwind rotor with active pitch control
Direction of rotation:	Clockwise
Number of blades:	3
Blade material:	Fibreglass; integrated lightning protection
Rotational speed:	Variable, 8.6 - 18.4 rpm
Pitch control:	Blade pitch system, one independent pitching system per rotor blade with allocated emergency supply
Main bearings:	Dual-row tapered/single-row cylindrical roller bearings
Generator:	Direct-drive synchronous annular generator
Grid feeding:	Converter
Braking systems:	3 independent blade pitch systems with emergency supply
Cut-out wind speed:	25 m/s (with storm control)



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APPENDIX

Investment & Asset Management

Ecoenergy will be the investment & asset management team on site to ensure site peak performance and to add value by improving project structure, operations, performance, and returns for portfolio optimisation and to maximise returns.

A summary of a manager's remit may include:

Pre Development Phase:

- Wind resource and site evaluation and qualifications
- Wind power program planning
- Wind power equipment technology evaluation
- Preliminary wind project economic and feasibility assessments

Development Phase:

- Site specific project evaluations
- Project business model development
- Project operating cost assessment and development
- Power purchase agreement evaluations
- Project design evaluations
- Project engineering and construction evaluations

Operational Phase:

- Operations and Asset Management assessments
- Project valuation analysis
- Project acquisition analysis and support services
- Project divesture and support services
- Project asset value improvement programs
- Project repowering evaluation and planning

Specifically, the asset manager will concentrate on:

Operational management

The asset managers are responsible for all operational activities including planning & maintenance, managing health and safety, controlling and initiating work and complying with industry best practice, including the BWEA wind turbine safety rules.

The asset management team also provide the ability to manage High Voltage faults or site emergencies, responding swiftly and managing the situation to minimise site downtime and consequential financial loss.

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Performance analysis

The operational asset management team will also conduct performance analysis and optimisation studies to ensure analysis of turbine performance, providing the in-depth information required to manage sites to their optimum level.

Utilising raw SCADA data, the operational team provide an independent analysis of turbine performance and availability, detailing all relevant instances.

If required and in combination with operational data analysis, the operational asset management team may conduct studies to determine if wind shear, forestry & landscape, turbulence or inflow angle are affecting turbine performance. With this knowledge the data can be analysed with optimisation solutions proposed.

The operational asset team can also represent interests in discussions with turbine suppliers on performance and warranty.

Inspections, Reviews & Audits

The operational asset managers provide audits and inspections covering operational management, health and safety, maintenance procedures, quality of ecology management, and end of warranty turbine inspections.

In addition, the asset managers can provide, when required, an overview of the condition of turbines and analysis of historical SCADA data so to determine each of the turbine's power curves which can be used to identify any gradual slip or step change in performance.