

BRECKLAND COUNCIL

Report of Mark Stokes – Services Director to the FULL COUNCIL COMMITTEE – 28 May 2009 **(Author: Ralph Burton, Asset Management)**

ELIZABETH HOUSE RENEWABLE ENERGY PROJECT

1. Purpose of Report

The Council's Environmental Strategy 2008-2013 sets out the Council's proposals to advance environmental sustainability both in the conduct of its own business and as a community leader. This report provides members with an update on a key action within the strategy, to develop a renewable energy installation and system at Elizabeth House, and requests approval to authorise the next stage of the project.

2. Recommendation(s)

To support the implementation of a wind turbine at Elizabeth House in accordance with the following stages:

- 1: Tender specialised renewable energy works in relation to undertaking preparation (studies) for the installation and review.
2. Prepare and submit planning application, undertake tender for capital works and apply for grant funding where appropriate.
3. Install wind turbine and handover.

Delegation to be provided to the new Green Agenda Development Panel to authorise the future stages of the project.

Note: In preparing this report, due regard has been had to equality of opportunity, human rights, prevention of crime and disorder, environmental and risk management considerations as appropriate. Relevant officers have been consulted in relation to any legal, financial or human resources implications and comments received are reflected in the report.

3. Information, Issues and Options

3.1 Background

- 3.1.1 The Environment Strategy sets out a clear strategic aim to focus on sustainably energy, to minimise the impact on climate change by all those living and working in the district. The strategy action plans set out a requirement to investigate and identify opportunities for alternative energy sources for Council buildings.
- 3.1.2 In response to this action, the Asset Management service began discussions with Solar Technologies (a renewable energy services company) to review options for the installation of renewable energy technology at Elizabeth House to generate on-site energy for use in Elizabeth House by the Council. Solar Technologies provided a basic outline of wind turbine and photovoltaic panel options and costs.
- 3.1.3 Further work included the commissioning of RD Energy Solutions (RDES) to carry out a site and local natural resource assessment to determine the most appropriate renewable technology option. Specific questions were asked about payback, grants, costs and alternative options.

3.2 Issues

3.2.1 Electricity represents over 90% of the site energy consumption, therefore the greatest opportunity for financial and Co2 savings is to generate renewable electricity using technology to match the site's average load requirements. RDES were asked to provide a recommendation on the optimum renewable energy technology applicable to Elizabeth House's energy usage requirements. **Appendix 1** demonstrates a comparison of the wind turbine options and their respective advantages and disadvantages.

3.2.2 **Next Stage**

Following further discussions with RDES estimates were provided to the Council on the further detailed works that need to be conducted before the final decision is made to install a wind turbine and the estimated capital cost of a 50kW wind turbine. These costs are provided in **Appendix 2**.

3.2.2.1 Based on this information if the Council wish to proceed with implementing a renewable energy technology at Elizabeth House in the form of a wind turbine the draft project plan is outlined in **Appendix 3**. The project plan outlines the stages and tasks required to deliver this project and an outline of the timescale. A renewable energy consultancy similar to RDES would be procured (to ensure value for money on the fees) to undertake staged works to mitigate risks. Members should note that the consultancy fees are not included in the payback analysis in the RDES report, only the supply and installation cost.

3.2.3 **Governance & Scrutiny**

Members will be updated at each stage of the project via the new Green Agenda Development Panel that will report via the committee system possibly via Overview & Scrutiny (to be determined). This group will act as the project board and delegation should be provided to this group to authorise the stages of the project.

3.3 Options

3.3.1 1) The Council authorises the installation a 50kW wind turbine that is delivered as per the attached project plan and estimated costs.

3.3.2 2) The Council authorises the installation of an 11kW wind turbine that is delivered as per the attached project plan and estimated costs.

3.3.3 3) The Council authorises the installation of a 6kW wind turbine that is delivered as per the attached project plan and estimated costs. If members choose this option members are requested to indicate either the horizontal blade or vertical blade choice.

3.3.4 2) The Council does not authorise the installation of any wind turbine option and ceases the renewable energy project at Elizabeth House.

3.4 Reasons for Recommendation(s)

3.4.1 Two renewable energy consultancy companies have both generated similar recommendations on the most appropriate renewable energy installation for Breckland Council to adopt which is a wind turbine:

- A 50kW turbine would create the optimum economies of scale relevant to the appropriate energy requirement at Elizabeth House, although it represents the largest investment.
- A 50kW turbine creates the shortest payback period and the greatest energy yield and therefore the largest Co2 reduction. If the Council wishes to lead on the climate change agenda and create the largest reduction in fossil fuel consumption and therefore the largest Co2 emissions that it can, this would seem the appropriate size and technology to use.
- The size of the turbine recommended in the RDES report meets the average load requirements of Elizabeth House and is applicable to the relative distance of nearby residential development. It is not a commercial wind turbine.

- Options 2 and 3 demonstrate the Council's commitment to the climate change agenda whilst reducing the capital cost. However both of the smaller turbines create much less energy yields and the payback periods are longer therefore asking the question - are they worth it in both renewable and financial terms?
- This report puts forward a recommendation based on the conclusions set out by an expert consultancy to fulfil the Council's green agenda.

4. Risk and Financial Implications

4.1 Risk

4.1.1 This is a significant capital project for the Council and a full risk analysis will be undertaken in conjunction with Finance to mitigate the Council's exposure and liabilities during the preparation stage of the installation.

4.2 Financial

4.2.1 This project is in the Capital Programme for 2009/10. The attached Proforma B outlines the current commitment and the situation and issues to consider.

5. Legal Implications

5.1 There are no specific legal issues that require comment here.

6. Other Implications

- a) Equalities – no implications to the best of our knowledge.
- b) Section 17, Crime and Disorder – no implications to the best of our knowledge.
- c) Section 40, Natural Environmental Rural Communities Act 2006 – no implications to the best of our knowledge.
- d) Human Resources – no implications to the best of our knowledge.
- e) Human Rights – no implications to the best of our knowledge.

7. Alignment to Council Priorities

7.1 The matter raised in this report falls within the following council aim and associated priority:

- Environment – to contribute to reducing the causes of climate change
- Entrepreneurial Council – identify and maximise the full earning potential of the Council.

8. Wards/Communities Affected

8.1 Dereham ward.

Background Papers

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Key Decision

This is not a key decision.

Appendices attached to this report:

Appendix 1: Estimate Professional Fees Quotation for a 50kW Wind Turbine (received from RDES)

Estimate Supply and Installation Fees Quotation for a 50kW Wind Turbine (received from RDES)

Appendix 2 Wind turbine evaluation

Appendix 3 Draft project plan for installation of wind turbine at Elizabeth House

Appendix 1

Wind Turbine Evaluation

The RDES report recommended a wind turbine installation for Elizabeth House. Compared to the second recommendation, photovoltaic panels the analysis showed wind turbines have lower capital costs being, shorter payback periods and higher energy yields. In addition the following information on wind turbines may assist:

- A wind turbine would not interfere with the fabric of the building with two site options to the north and south of Elizabeth House.
- Grant funding through the Low Carbon Buildings Programme is currently available until June 2009 and at the time of writing this report no announcement has been made for future funding. The grant funding is limited to smaller wind turbines up to approximately 6kW output. Therefore future decision on investment should be made on what is available now although grant funding will be sought where applicable.
- A digital energy display board can be installed in Elizabeth House Reception to show the real-time energy generated from the turbine and Co2 savings.
- The RDES report provides conservative calculations on wind resource available to obtain a conservative payback analysis and therefore it will vary depending on this resource but unlikely to be lower than outlined.

The following tables outline the key evaluation facts between the different wind turbine options:

Physical:				
Product	Revolution	Proven	Gaia	Entegrity
Size	6kW	6kW	11kW	50kW
Blade Aspect	Vertical	Horizontal	Horizontal	Horizontal
Tower size	9m	up to 15m	18m	up to 36m
Rotor Diameter	3m	n/a	13m	15m
No. of blades	3	3	2	3
Financial:				
Capital cost	£49,000	£30,000	£56,900	£210,000
Annual Operational Cost	£400	£400	£1,200	£3,000
Energy Yield	7,600 kWh	7,900 kWh	27,393 kWh	101,585 kWh
1st Year Revenue	£1,663	£1,694	£5,548	£20,564
Annual Co2 emission reduction	4 tonnes	4 tonnes	15 tonnes	55 tonnes
% of E.Hse Electricity Usage	1.27%	1.33%	4.59%	17.03%
Grant funding available	0%	50%	0%	0%
Payback:				
Payback periods				
Energy inflation at 3.5%	26 years	18 years	11 years	10 years
Energy inflation at 5%	23 years	16 years	10 years	10 years
Energy inflation at 10%	18 years	13 years	9 years	9 years
Payback with grant funding:				
Energy inflation at 3.5%	n/a	13 years	n/a	n/a
Energy inflation at 5%	n/a	12 years	n/a	n/a
Energy inflation at 10%	n/a	10 years	n/a	n/a

Comparative Advantages & Disadvantages

Turbine Type	Advantages	Disadvantages
6kW Vertical Blade	<ul style="list-style-type: none"> • Almost silent • High performance in turbulent airflow • Lowest annual operational costs 	<ul style="list-style-type: none"> • Highest payback periods • Lowest % of Co2 emission reduction • Lowest energy yield and therefore lowest % of annual energy savings • No grant funding

		<ul style="list-style-type: none"> • Not as well proven technology as the horizontal blade systems • Costs 10% more than the equivalent horizontal blade option making the payback period longer.
6kW Horizontal Blade	<ul style="list-style-type: none"> • Lowest annual operational costs • Lowest capital installation cost • 50% grant funding available 	<ul style="list-style-type: none"> • Lowest % of Co2 emission reduction • Low energy yield and therefore low % of annual energy savings
11kW Horizontal Blade		<ul style="list-style-type: none"> • Low energy yield and therefore low % of annual energy savings • No grant funding
50kW Horizontal Blade	<ul style="list-style-type: none"> • Best size match to the scale of average electrical load on the site • Maximum scale turbine due to proximity of residential developments • Takes most advantage of estimated wind resources available at site • Greatest energy yield and therefore greatest % of annual energy savings • Lowest payback periods therefore best financial performance • Greatest % of Co2 emission reduction • Highest tower therefore greatest wind resource and higher efficiencies 	<ul style="list-style-type: none"> • Highest annual operational costs • Highest capital installation cost • No grant funding • Highest consultancy costs

Appendix 2

Estimate Professional Fees Quotation for a 50kW Wind Turbine (received from RDES)

Professional Fees	Estimated Cost
Environmental Overview (site and ground survey, services check, noise check, screening study to reduce risk of objection from Norwich Airport)	£6,500
Planning Application (assuming no bad neighbour and CAD files supplied)	£3,400
Design Fees (assuming SI study is complete)	£7,500
Performance Specification and Procurement Documentation	£1,500
Due Diligence on Tenders	£900
Preparation of Contracts	£2,500
Construction Supervision	£7,500
CDM and H&SE	£3,500
Handover Supervision	£2,500
Total	£35,800**

**The professional fees for a smaller wind turbine will be no more than this amount and likely to be less.

Estimate Supply and Installation Fees Quotation for a 50kW Wind Turbine (received from RDES)

Supply and Install	
Nacelle and rotor	£100,000
25m monopole tower	£39,000
Shipping and delivery to site	£5,500
Handling fee and Import tax	£6,950
Full foundation construction	£22,000
Offloading and Handling	£1,000
Crane hire	£8,000
M&E Installation Labour	£12,600
Commissioning	£3,500
Total	£198,550*

*Differs from RDES report due to removal of design fees which are added to professional fees above. Also does not include costs for grid connection or metering supply.

