

GCE

Environmental Technology

**Unit AS2: Internal
Assessment –
Renewable Energy
Technologies**

For first teaching from September 2013
For first award in Summer 2014

environmental
technology

Unit AS2: Internal Assessment – Renewable Energy Technologies

Title: *This could start along these lines:*

The purpose of this report is to provide recommendations to Green Living Ltd regarding the proposed development of 10 holiday homes – 7 single storey and 3 double storey – on the site identified on the north coast of Northern Ireland.

Introduction: The report includes detailed desktop research of the available renewable technologies as they relate to the site in question. The scenario presents a degree of technical information detailing the site size, topography, wind yield, solar coverage, the nature of the buildings and their energy requirement. There is also information regarding the possibility of using biomass to achieve a figure of at least 80% reliance on renewable energies for the development. *This section could then go on to offer a rationale for the chosen focus of the desktop research, including a link to the scenario-up to a maximum of 500 words.*

Desktop Research

The scenario provides details of the opportunities for the deployment of Solar, wind and biomass technologies. The desktop research concentrates on these three renewable technologies and their use in developments of this type. Each technology is researched with particular reference to energy efficiency, cost effectiveness for the proposed scenario, environmental impact and security and continuity of supply.

Solar – short description of technology followed by detail of a similar application e.g. www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology/Solar-panels-PV

Wind – short description of technology followed by detail of a similar application e.g. www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology/Wind-turbines

Biomass – short description of technology followed by detail of a similar application e.g. www.biomassenergycentre.org.uk/portal/page?_pageid=76,15049&_dad=portal

The links above can be used as starting points for detailed research. Each link has a number of tabs leading on to more detailed information.

Each of the above renewable energy sources to be summarised under the four headings:



iStock / Thinkstock.com

- Energy efficiency
- Cost effectiveness
- Environmental impact
- Security and continuity of supply.

This link can be used to gain information on some case studies
www.energysavingtrust.org.uk/Generating-energy/Case-studies

Further hard copy research can be done using:

Renewable Energy Godfrey Boyle Oxford

www.seai.ie/Renewables/Wind_Energy/Best%20Practice%20Guidelines%20for%20the%20Irish%20Wind%20Energy%20Industry.pdf

Research Summary – *Produce* a list of the most important and relevant findings of the desktop research with specific reference to their relevance to the scenario.

Evaluation – *Provide* an evaluation of the research findings with comments on their relevance to the specific issue raised in the scenario.

References – All sources to be clearly referenced.

This section to extend to but not exceed 1000 words – it will almost certainly contain diagrams, images and tables of numerical information.

Practical Investigation

At this point candidates should decide which **two** relevant factors related to the use of **two** of the renewable energies researched in the desktop research section will form the basis of the practical investigation.

Candidates need to:

- *Demonstrate an awareness of the design implications presented by the scenario,*
- *Provide a strong rationale for the choice of practical investigation – why they have chosen their particular investigations and their relevance to the scenario,*
- *Provide comprehensive details of the design of the investigation (including diagrams) to include equipment used, method of investigation and means by which data is collected,*
- *Produce detailed and accurate calculations to support their final recommendations,*
- *If necessary record data in a range of formats,*
- *Interpret and analyse the data collected in the investigation,*
- *Make note of any health and safety issues related to the practical investigations themselves and how these can be minimised.*

The choice of practical research activity is open to the candidate but must allow for each of the above to be achieved with a length of no more than 1000 words.

Typical examples of the practical investigation could be:

1. Measurement of the output of a thermal solar panel in conditions similar to the context. This could involve measuring the initial temperature of the water in the panel, then placing the panel into direct sunlight for a period of time followed by measurement of the temperature after a specified time of exposure to sunlight. Analysis of the results of this practical activity could lead to calculations of the amount of energy captured from the sunlight. This could then lead to a cost benefit analysis by relating the energy generated to the possible demand in the scenario.
2. Investigation of the energy captured by a simple wind turbine under different wind conditions. This could be done using a turbine similar to that used in a domestic installation or in the laboratory environment by using proprietary educational wind turbine kits and a variable speed fan. The investigation could make use of the equation $p=1/2\rho AV^3$ to provide an indication of the power



output of the wind turbine with different wind conditions. This could be developed to include a typical wind distribution graph for the scenario. This could also lead to a cost benefit analysis of the use of wind turbines in the scenario.

3. Measurement of the energy content of various energy crops leading to calculations of the potential for the production of biomass generated energy from the area identified in the scenario.

Discussion and Recommendations

In this section candidates should;

- *Provide an extensive and clear discussion making clear reference to the scenario task,*
- *Provide a comprehensive list of recommendations that are supported by findings from the research summary and the outcome of the practical research.*

For each technology being recommended consideration must be shown of;

- The site details as provided by the scenario,
- A cost benefit analysis,
- Environmental impact
- Security and continuity of supply
- Capacity of the chosen technologies to meet the target of 80% energy needs.

This final section should not exceed 1500 words and may include diagrams, images and tables of numerical information.

