GCE

Rewarding Learning

Chief Examiner's and Principal Moderator's Report

Environmental Technology

Summer Series 2019

Foreword

This booklet outlines the performance of candidates in all aspects of this specification for the Summer 2019 series.

CCEA hopes that the Chief Examiner's and/or Principal Moderator's report(s) will be viewed as a helpful and constructive medium to further support teachers and the learning process.

This booklet forms part of the suite of support materials for the specification. Further materials are available from the specification's section on our website at www.ccea.org.uk.

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GCE ENVIRONMENTAL TECHNOLOGY

Chief Examiner's Report

General

The majority of candidates were well prepared for both assessment units in the examination although a wide range of marks was awarded in both. The subject is becoming well established in centres and this was reflected in the standard of work presented by candidates.

Candidates provided a range of responses across the three assessment objectives in the specification. It is evident that some candidates need to prepare more thoroughly for those questions addressing specific scientific concepts contained within the specification. The mean mark in Unit AS 1 was 42 which is a decrease of 2.6 on the previous series. In Unit AS 2, internal assessment, the mean mark was 36.2 which is an increase of 0.8 on the previous series. The mean mark in Unit A2 1 was 55.4 which is a decrease of 3.3 on the previous series. In Unit A2 2, internal assessment, the mean mark was 36.9 which is an increase of 1.7 on the previous series.

One general point is that the specification outlines word limits on the internal assessment and sections therein. A number of candidates are producing internal assessment reports which are in excess of these limits. Additional credit is not awarded in such cases and teachers, in their supervisory capacity, should be encouraging candidates to produce their findings in a report form which adheres to the word limits outlined in the specification.

Assessment Unit AS 1 The Earth's Capacity to Support Human Activity

Overview

There was clear evidence from the responses of the candidates that all questions were accessible.

There was no evidence of any particular question providing undue difficulty for the candidature.

There was no evidence that the paper was too long for the time permitted.

A full range of marks was awarded.

Q1 **(a)** This question was answered correctly by the majority of candidates.

(b) Most candidates were able to answer this question correctly. A number of candidates provided responses which might be regarded as unethical means of securing fuel security. Whilst these may exist in reality, teachers are encouraged to direct their students towards the form of response provided in the published mark scheme as being more appropriate in the educational context.

(c) Some candidates failed to receive credit for their response to this question as they referred to the environmental impact of emerging economies rather than the economic impact as required by the question.

Q2 **(a)** This question was well answered by a large number of candidates.

(b) This question was generally well answered.

(c) Parts (i) and (ii) of this question were well answered by a large number of candidates. Some candidates stated 'cheaper' as an advantage of using biomass as an alternative to fossil fuels without any attempt to quantify this statement.

(d) A surprising number of candidates were unable to name the two main gases present in syngas. These are identified clearly in the specification for the subject.

Q3 **(a)** Part (i) of this question was well answered by a number of candidates. A surprising number were unable to provide basic details of fractional distillation. Part (ii) was not well answered in a number of cases with candidates appearing to be unaware of the need to cool and liquefy the products of the fractional distillation process.

(b) Part (i) of this question was generally well answered with candidates providing a clear explanation of the problems caused by plastic pollution in the oceans. However, Part (ii) was not well answered by a significant number of candidates. The question required a description of the manufacturing process which results in the production of biodegradable or photodegradable plastic. In too many cases responses stated the outcome without providing detail on the process involved in production of the plastic.

Q4 **(a)** This question was generally well answered by the majority of candidates.

(b) This question was generally well answered although some candidates failed to recognise that the form of energy labelled A was potential.

(c) This question was generally well answered.

(d) Some candidates failed to achieve the 4 marks available for this question by providing a description of CHP but failing to contrast this with the processes in a traditional power plant.

Q5 **(a)** This question was well answered by a significant number of candidates.

(b) Parts (i) and (ii) of this question were generally answered well by most candidates. In response to Part (ii) some candidates proposed considering the available roof space and energy requirements of the house but these had already been provided in the stem of the question.

(c) This question was not well answered in a significant number of cases with a lack of knowledge of automatic solar tracking being evident. This requirement is stated clearly in the specification for the subject.

Q6 **(a)** This question was generally well answered.

(b) In response to Part (i) of this question a number of candidates stated that the shaded area would increase by a factor of 4 if the length of the rotor blades were doubled but did not explain why this was the case. The question clearly asked for this explanation. Part (ii) of this question was well answered.

(c) This question was generally well answered although a surprising number of candidates either did not know the equation for kinetic energy or used an incorrect form of the equation.

(d) In response to Part (i) of this question a large number of candidates displayed good knowledge of the Betz Limit when applied to a wind turbine. However, a number were unable to explain how the Betz Limit relates to power efficiencies achievable by wind turbines in the real world. In these cases whilst candidates were able to state the lower efficiencies of real world wind turbines they did not explain that this was due to energy losses in the turbine itself.

(e) This question was well answered in a large number of cases.

(f) This question was well answered in a large number of cases.

Q7 The full range of marks was awarded in response to this question. The question was structured in such a way as to direct candidates to provide an overview of energy storage, specific details of the two main grid-scale forms of renewable energy storage and how these can contribute to the development of flexible energy systems. The best responses followed this pattern and some candidates displayed a thorough knowledge of the various issues concerned complemented with very good spelling, punctuation and grammar. In a small number of cases candidates missed the point of the question and provided details on a range of unrelated renewable energy issues.

Principal Moderator's Report

Assessment Unit AS 2 Renewable Energy Technologies

Overview

Marking was generally to a good and accurate standard. Most centres marked within tolerance. Annotation, in most cases, was good, detailed and relevant. Most candidate task responses were well packaged and complete. Some candidates produced high quality work and most candidates showed a very thorough understanding of the scenario and the implementation of renewable energy technologies to it.

AO1: Reports were well illustrated and generally a comprehensive and thorough overview of the three renewable technologies was given. The reports were excellently written using specialist vocabulary. Referencing is still a little erratic with most candidates correctly identifying the reference to the text but a few giving only a bibliography type list with no link to the text at all. It should be mentioned that all references given should be accompanied by a date when the reference was accessed. It must again be mentioned that the desktop research should be centred on and refer specifically to the requirements of the scenario.

AO2: The practical investigations were well carried out. The design used was appropriate and clear. The calculations produced by most candidates were relevant and accurate. Once again it should be mentioned that the practical investigations chosen should have as their basis the requirements of the scenario.

AO3: Most physical measurements were accurate with few errors. The data was mostly presented in a range of formats. Most candidates produced a comprehensive recommendation with strong rationale. It must be pointed out, however, that the risks aspect in AO3 should also be referenced to the practical investigations as well as the desktop research.

Chief Examiner's Report

Assessment Unit A2 1 Building and Managing a Sustainable Future

Overview

All questions on the examination paper proved to be accessible and there was no evidence of any questions which were not being answered by candidates.

A full range of marks was awarded for all of the questions.

There was no evidence that candidates misunderstood questions due to the language used in the paper.

There was no evidence that the paper was too long for the time allocated.

Q1 Part (a) of this question was answered correctly by a significant number of candidates. Part (b) was generally answered well, although a number of candidates confused location issues with those more associated with development of landfill sites. Part (c) dealing with landfill tax was well answered.

Q2 Part (b) of this question which required simple recall responses was well answered. However, in response to Part (a) some candidates failed to provide a full explanation of how anaerobic digestion can be used in conjunction with CHP. Answers to Part (c) were variable in terms of the level of detail provided and illustrated a low level of knowledge on the part of some candidates of the two named stages in the anaerobic digestion process.

Q3 This question was generally well answered however a number of candidates disadvantaged themselves by naming a plant type used in phytoextraction/ remediation in response to Part (a). In these cases care was taken by markers not to penalise candidates throughout the question for this initial error. Answers to Parts (b), (c) and (d) would have benefited from more detailed explanations and discussions in a number of cases.

Q4 Part (a) of this question was generally well answered. Responses to Part (b) were too general in some cases and did not clearly describe the use of hydrogen fuels cells as backup energy sources.

Q5 Part (a) of this question was well answered by a large number of candidates. In response to Part (b) some candidates referred to material properties which contribute to the U value of the material and so did not answer the question correctly. The calculation in Part (c) was well answered with candidates generally following the instruction to set working out in the space provided. In Part (d) some candidates outlined One Planet Principles or renewables instead of Fabric Energy Efficiency requirements of the Zero Carbon Homes hierarchy

Q6 In response to Part (a) of this question most candidates were able to refer to how an increasing world population affects demand for food and energy. However, a large number failed to refer to the increased use of water in the production of crops and livestock and in the wider areas of industrialisation and urbanisation. Too many responses concentrated on personal and domestic use of water. A surprising number of candidates provided limited answers in response to Part (b) on sustainable materials and zero waste.

Q7 This question was generally well answered although some candidates explained problems associated with the four issues identified in the question, but did not provide details on how these could be dealt with in ways that would underpin the development of sustainable rural communities.

Q8 Part (a) of this question was answered well in a large number of case with candidates displaying a good knowledge of tidal stream generators and tidal barrages and the differences between them as generating methods for tidal power. Responses to Part (b) were more inconsistent with some candidates being unaware of the advantages and risks associated with the use of geo-engineering. Most candidates were able to state biophotovoltaics as the process of using algae to generate electricity in biological solar cells.

Q9 In response to this question a significant number of candidates displayed a detailed knowledge of the challenges associated with developing transport systems for the future and how biofuels might address these. A good response was provided in a large number of cases when referring to the issues associated with the global production of fuels. However, the second bullet point in the question required candidates to provide details on the production of biodiesel and bioethanol and to include the chemical equation for bioethanol production. A number of candidates confused one process with the other whilst others made incorrect or no reference to the chemical equation.

Principal Moderator's Report

Assessment Unit A2 2 Environmental Building Performance and Measurement

Overview

Marking in most centres was good and accurate and within tolerance. Annotation, in most cases, was good, detailed and relevant. Some of the candidates produced high quality work and most candidates showed a very thorough understanding of CSH and its implementation to the task issues. It must be pointed out, however, that there is a word limit outlined in the coursework and it is the centre's responsibility to ensure that it is adhered to.

AO1: The reports were well illustrated and generally showed a comprehensive and thorough overview of CSH within the wider context of sustainability measurement. The quality of the written reports was excellent with clear evidence of the use of specialist vocabulary. Candidates who achieved good marks in this assessment objective provided a good overview of CSH within the wider context of sustainability. Some candidates would have benefitted by providing a more detailed overview of the CSH assessment procedure. Referencing was still a little erratic with many candidates correctly identifying the reference to the body of the text but a few only giving a bibliography type list. It should also be pointed out that each reference should be time dated.

AO2: Most candidates identified a range of investigations. A more detailed methodology and analysis of their findings would have improved some candidates' overall marks. Also some candidates could have improved their mark by identifying the physical measurements for the specified categories. All candidates used more than one source to obtain data for the seven categories. The calculations produced by most candidates were comprehensive and accurate. It should be pointed out that the case studies chosen should have some relationship with the building under investigation. Some centres used a colour coding system to show the relevance of each case study to the building under consideration.

AO3: Most physical measurements were accurate with few errors. The data was mostly presented in a range of formats. Most candidates produced a comprehensive list of recommendations with strong rationale for each. It should be noted, however, that the health and safety aspect in AO3 should be referenced to the recommendations presented. To improve their work candidates should include an evaluation of the sustainability measurement processes used throughout their investigation and the CSH assessment.

Contact details

The following information provides contact details for key staff members:

- **Specification Support Officer: Paul Grogan**
  (telephone: (028) 9026 1200, extension: 2292, email: pgrogan@ccea.org.uk)
- **Officer with Subject Responsibility: Judith Ryan**
  (telephone: (028) 9026 1200, extension: 2133, email: jryan@ccea.org.uk)

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COUNCIL FOR THE **CURRICULUM, EXAMINATIONS** AND **ASSESSMENT**
29 Clarendon Road, Clarendon Dock, Belfast BT1 3BG
Tel: +44 (0)28 9026 1200 Fax: +44 (0)28 9026 1234
Email: info@ccea.org.uk Web: www.ccea.org.uk

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