UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For the following qualifications :-

M.Sc.

ESGE1: The Built Environment: The Energy Context

COURSE CODE	:	**ENVSGE01**
DATE	:	**07-MAY-02**
TIME	:	**14.30**
TIME ALLOWED	:	**2 hours**

UNIVERSITY OF LONDON

MSc DEGREE in SCIENCE in BUILT ENVIRONMENT 2002

for Internal Students of University College London

Module ENVS GE 01: BUILT ENVIRONMENT: The Energy Context

Answer TWO questions only. Answer all parts of the questions chosen.

1. (a) Explain the difference between primary, delivered and useful energy. (*5 marks*)

   (b) An electric heating system and a gas heating system both use the same amount of delivered energy. How will the useful and primary energy use differ between the two systems? Why? (*5 marks*)

   (c) Which heating system, gas or electric, will cost more to run and result in larger CO_2 emissions? Explain your answer and detail any assumptions you make. (*5 marks*)

   (d) You have been asked to comment on the appropriateness of an electric heating system and a gas heating system for two different buildings:

      (i) a home for the aged, which requires 24 hour heating to 23°C
      (ii) a sports changing facility which is used twice a week for a total of 8 hours a week to 18°C.

      The capital cost of the gas system is twice that of the electric for the given delivered energy. Using assumed efficiencies and fuel costs, explain in general terms which system would be the more appropriate for each application in terms of CO_2 emissions, running costs and total life cycle costs. (*25 marks*)

   (e) What impact would assuming a very high discount rate have on the life cycle costs in part (d). (*10 marks*)

2. (a) The world's "reserves to production" ratio R/P for oil is currently 40 years. Explain why this does NOT mean the world's supply of oil will run out in 40 years. (*10 marks*)

   (b) The UK government's Standard Assessment Procedure (SAP) rating for oil fired heating systems is high compared to electric or gas heating systems. Explain why this is the case. (*5 marks*)

   (c) What factors impact on the SAP rating of a dwelling? Why? (*10 marks*)

(d) The 2002 version of the Standard Assessment Procedure also includes a "carbon performance" rating. Explain in what way the carbon rating is different to the SAP rating, and the modifications to a building which are likely to have a large impact on the carbon performance rating but not on the SAP rating. (*10 marks*)

(e) What modifications to the SAP calculation would be required to make it applicable to non-domestic buildings? Explain why? (*15 marks*)

3. (a) Discuss the term "renewable energy" and explain why it can be applied to electricity generated from wind by wind turbines. (*6 marks*)

(b) In relation to a wind turbine, explain the meaning of the following terms: "rated wind speed", "rated power", "shut-down wind speed" and "cut-in wind speed". (*8 marks*)

(c) Explain the meaning of "solidity" in relation to a wind turbine. How does solidity affect the performance of wind turbines? (*6 marks*)

(d) Discuss the issues involved in selecting an appropriate site for a "wind farm". (*5 marks*)

(e) Discuss the issues involved in selecting appropriate wind turbines for a particular site. (*5 marks*)

(f) What are the *disadvantages* of generating electricity by wind turbines compared to generation from fossil fuels in power stations? (*5 marks*)

(g) List **THREE** other forms of "renewable energy" which are currently used, or are under investigation for use, in the UK? Give a brief description of the electricity generation process of each of these three technologies. (*15 marks*)

4. (a) Explain why a co-ordinated transport and planning policy is important in reducing CO_2 emissions and ill-health in cities? (*5 marks*)

(b) Discuss briefly what adverse health effects are believed to be caused by the use of and emissions from motor vehicles. (*5 marks*)

(c) Describe in your view what might constitute a co-ordinated transport and planning policy, producing the "low CO_2 - low polluting - healthy" city? (*20 marks*)

(d) What are the problems faced by national governments in implementing these policies? (*5 marks*)

(e) Describe briefly what "technological fixes" might be possible in reducing emissions from motor vehicles. (*15 marks*)

END OF PAPER