



National Unit specification: general information

Unit title: Building Services Engineering: Energy and the Environment (SCQF level 5)

Unit code: FT82 11

Superclass: TH

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Summary

The Unit is a mandatory Unit of the Skills for Work Building Services Engineering Award and as such is suitable for candidates with little or no previous engineering, technical or employment experience. The candidate will learn to identify and explain the types of energy and their sources. The candidate will also learn to identify energy conservation methods and technology as they apply to the building services engineering (BSE) sector. Candidates will also learn about disposal of hazardous and non-hazardous material as they apply to the BSE sector.

Outcomes

- 1 Identify and explain the main types, sources and operating principles of energy and the reasons for reducing carbon emissions from domestic households.
- 2 Explain the methods and types of energy conservation and material disposal.

Recommended entry

Entry is at the discretion of the centre.

Credit points and level

1 National Unit credit at SCQF level 5: (6 SCQF credit points at SCQF level 5*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

General information (cont)

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill component in this Unit.

National Unit specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Identify and explain the main types, sources and operating principles of energy and the reasons for reducing carbon emissions from domestic households.

Performance Criteria

- (a) Identify and explain types of energy used in domestic households.
- (b) Identify and explain the sources of energy used in domestic households.
- (c) Explain the main reasons for reducing carbon emissions from domestic households and the contribution being made by the BSE sector to achieve it.
- (d) Explain the basic operating principles of environmental energy sources.

Outcome 2

Explain the methods and types of energy conservation and material disposal.

Performance Criteria

- (a) Explain the working practices associated with energy conservation and environmental protection.
- (b) Explain the main methods of conserving water and reducing wastage of water.
- (c) Explain the main types of material disposal.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

Evidence is required to demonstrate that the candidate has achieved all Outcomes and Performance Criteria.

The evidence may be produced by one or more than one assessment covering all Outcomes.

Written and/or oral evidence should be produced for Outcomes 1–2 to demonstrate that the candidate has achieved all the Outcomes and Performance Criteria. The evidence should be produced in open-book supervised and controlled conditions.

In terms of the specific Outcomes of this Unit:

Outcome 1: Written and/or oral evidence

Candidates must be able to identify and explain the types of energy used in domestic households including all of the following:

- ◆ High carbon — to include all of natural gas/LPG, Fuel oils, solid fuels (coal and peat), and electricity (from non-renewable sources)
- ◆ Low carbon — to include all of solar thermal, solid fuel (biomass), hydrogen fuel cells, heat pumps, combined heat and power (CHP), and combined cooling, heat and power (CCHP)
- ◆ Zero carbon — to include all of electricity (wind), electricity (tidal), hydroelectric: solar photovoltaic

Candidates must be able to explain all of the following:

- ◆ The main reasons for reducing carbon emissions from buildings.
- ◆ How building services engineering industries are working to reduce carbon emissions from buildings.
- ◆ The basic operating principles of installations containing environmental energy sources including four of the following: combined cooling, heat and power (CCHP), combined heat and power (CHP), grey water harvesting, heat pumps (water, air and ground source), rain water harvesting, solar photovoltaic, solar thermal, solid fuel (biomass), wind turbine.
- ◆ How and where to get more guidance and advice on energy saving and conservation techniques.

National Unit specification: statement of standards (cont)

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Outcome 2: Written and/or oral evidence

Candidates must be able to explain all of the following:

- ◆ The basic working practices associated with energy conservation and environmental protection including planning work activities, accurate measurement and cutting, reducing material over-ordering, minimising damage to stored materials, prevention of loss/theft.
- ◆ The responsibilities, under energy conservation legislation, of construction team members including clients (customers), designers, employees and employers.
- ◆ The working practices associated with water conservation within buildings including three of the following: flow reducing valves, spray taps, low volume flush WC, regular maintenance of terminal fittings and float valves, promoting user awareness, methods and reasons for capturing surface water, and recycling used water.
- ◆ The methods and processes of safely disposing of different waste materials (metals, plastics, wood/cardboard) associated with licensed waste disposal, waste carriers' license, recycling.
- ◆ The methods and processes of safely disposing of potentially hazardous materials including asbestos, electrical and electronic equipment, and refrigerants (fluorinated gases).
- ◆ The implications and dangers associated with incorrect waste disposal.

National Unit specification: support notes

Unit title: Building Services Engineering: Energy and the Environment (SCQF level 5)

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

The main purpose of the Unit is to make candidates aware of, and prepare for employment within, the BSE sector in any of the main occupational areas of plumbing, electrical, heating and ventilating, and refrigeration and air conditioning.

Outcome 1 covers the main types of energy used in domestic households where these are categorised by their carbon footprint as high carbon, low carbon and zero carbon. The candidate will develop an understanding of the range of energy types and the main reasons for reducing carbon emissions from buildings. The candidate will also develop an understanding of the contribution being made by the BSE sector to reduce carbon emissions and of the basic operating principles of low and zero carbon environmental energy sources. The candidate will develop an understanding of how and where to get more guidance and advice on energy saving and conservation techniques.

Outcome 2 covers the basic working practices associated with energy conservation and environmental protection as well as the key area of water conservation within buildings. The candidate should be encouraged to consider the implications of non-compliance with appropriate waste disposal methods.

Guidance on learning and teaching approaches for this Unit

Candidates should be given opportunities to work towards Outcomes in an integrated way whenever possible.

Practical activities should be teacher/lecturer-led in that all equipment, techniques and processes should be explained, demonstrated and thoroughly understood before (candidate) commencement. Demonstrations should be clear, logically sequenced and reflect current safe working practices to ensure candidate understanding.

An integrated approach to learning and teaching across the Outcomes in this Unit, and relevant others, is suggested

Opportunities for developing Core Skills

Throughout this Unit there may be opportunities for candidates to develop the Core Skill of *Communication* at SCQF level 5. This may be possible whilst the candidate is describing and explaining the responses during the assessment process.

National Unit specification: support notes (cont)

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Guidance on approaches to assessment for this Unit

An integrated approach to assessment across the Outcomes in this Unit is suggested. If this is being delivered as part of the National Progression Award the use of holistic assessment with other applicable Units is suggested. In addition, the project-based approach may be used to gather evidence of candidate achievement.

Candidates could be assessed on their knowledge and understanding of the main types of energy and sources of energy used in the BSE sector by using a questioning method such as restricted response/short answer questions. This will ensure that candidates have the knowledge and understanding. It is also recommended that the questions used should sample across the PCs.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communication technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements

History of changes to Unit

Version	Description of change	Date

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