Unit Specification

Unit title: Building Services Engineering: Introduction to Energy (National 4)

Unit code: J13H 74

Superclass: TH

Publication date: August 2018

Source: Scottish Qualifications Authority

Version: 2.0

Unit purpose

This is a mandatory unit of the National 4 Skills for Work Building Services Engineering course, and is suitable for learners with no previous engineering, technical or employment experience. The learner will be introduced to and learn to identify the main types of energy and their sources as well as the fundamentals of energy conservation as they apply to the household building services engineering (BSE) sector. Learners will also learn the main types of material disposal as they apply to the BSE sector.

Outcomes

On successful completion of the unit the learner will be able to:

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

Credit points and level

1 National unit credit at SCQF level 4: (6 SCQF credit points at SCQF level 4)

Recommended entry to the unit

Entry is at the discretion of the centre.

Core Skills

Achievement of this unit gives automatic certification of the following Core Skills component:

Complete Core Skill	None
Core Skill component	Critical Thinking at SCQF level 4

There are also opportunities to develop aspects of Core Skills which are highlighted in the support notes of this unit specification.

Context for delivery

If this unit is delivered as part of a course, it is recommended that it should be taught and assessed within the subject area of the course to which it contributes.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

National unit specification: statement of standards

Unit title: Building Services Engineering: Introduction to Energy (National 4)

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

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

Performance criteria

(a) Describe the two main types of energy used in households.
(b) Describe sources of energy that can be used in households.
(c) Explain the main reasons for reducing carbon emissions from households and the contribution being made by the BSE sector to achieve it.

Outcome 2

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

Performance criteria

(a) Explain the basic 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.

Evidence requirements for this unit

Evidence is required to demonstrate that learners have achieved all outcomes and performance criteria.

Written and/or oral evidence should be produced to demonstrate that the learner has achieved all the outcomes and performance criteria. The evidence should be produced in the form of open-book, supervised and controlled conditions.

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

Outcome 1

Learners must correctly describe two of the main types of energy used in households in terms of the carbon footprint, from the following:

- high carbon energy sources from: natural gas/LPG, fuel oils, solid fuels (coal and peat), electricity (from non-renewable sources)
- low carbon energy sources from: solar thermal, solid fuel (biomass), hydrogen fuel cells, heat pumps, combined heat and power (CHP), combined cooling, heat and power (CCHP)
- zero carbon energy sources from: electricity (wind), electricity (tidal), hydroelectric, solar photovoltaic

Learners must also explain all of the following:

- the main reasons for reducing carbon emissions from households
- how building services engineering industries are working to reduce carbon emissions from households
- how and where to get more guidance and advice on energy saving and conservation techniques

Learners must also identify the basic operating principles of installations containing environmental energy sources, including solar thermal, wind turbine, solar photovoltaic.

Outcome 2

Learners must explain all of the following:

- the working practices associated with energy conservation and environmental protection including:
  - planning work activities
  - accurate measurement
  - cutting and re-use of off-cuts
- the basic working practices associated with water conservation within households, including **three** of the following:
  - flow reducing valves, spray taps, low volume flush WC
  - methods and reasons for capturing surface water
  - promoting user awareness
  - recycling used water
  - regular maintenance of terminal fittings and float valves
- the methods and processes of safely disposing of waste materials associated with licensed waste disposal; waste carriers license; recycling
- the implications and dangers associated with incorrect waste disposal

Development of Skills for Learning, Skills for Life and Skills for Work

It is expected that learners will develop broad, generic skills through this unit. Employability is a key aspect of Skills for Work and is present throughout the unit. In addition, there are a number of other skills that learners will be expected to improve on and develop as they undertake this unit, these can be drawn from the main skills areas listed below. These must be built into the unit where there are appropriate opportunities.

1 Literacy
1.1 Reading
1.2 Writing
1.3 Listening and talking

4 Employability, enterprise and citizenship
4.1 Employability

5 Thinking Skills
5.1 Remembering
5.2 Understanding
5.3 Applying
5.4 Analysing and evaluating
5.5 Creating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work.* The level of these skills should be at the same SCQF level as the unit and be consistent with the SCQF level descriptor. Further information on building in Skills for Learning, Skills for Life and Skills for Work is given in the 'National unit support notes' section.

National unit support notes

Unit title: Building Services Engineering: Introduction to Energy (National 4)

Unit support notes are offered as guidance and 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 content and context of this unit is at a basic, introductory level. The main purpose of the unit is to make learners aware of, and prepare for employment within, the BSE sector in any of the main occupational areas of plumbing, electrical, heating and ventilating, refrigeration and air conditioning.

Outcome 1

This outcome covers the main types of energy used in households where these are categorised by their carbon footprint as high carbon, low carbon and zero carbon. The learner will develop an understanding of the range of energy types and the main reasons for reducing carbon emissions from households. The learner 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 learner will develop an understanding of how and where to get more guidance and advice on energy saving and conservation techniques.

Outcome 2

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

Guidance on approaches to delivery of this unit

Learners 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 (learner) commencement. Demonstrations should be clear, logically sequenced and reflect current safe working practices to ensure learner understanding.

Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

An integrated approach to assessment across the outcomes in this unit is suggested. If this is being delivered as part of the National 4 Skills for Work Building Services Engineering course, the use of holistic assessment with other applicable units is suggested. In addition, the project-based approach may be used to gather evidence of learner achievement. Centres may also wish to develop the employability skills of the learners through role-play techniques where appropriate.

Learners 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 learners have the knowledge and understanding. It is also recommended that the questions used should sample across all the performance criteria.

Opportunities for 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 social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core Skills

Throughout this unit there may be opportunities for learners to develop the Core Skill of Communication at SCQF level 4. This may be possible whilst the learner is describing and explaining the responses during the assessment process.

This unit has the Critical Thinking component of Problem Solving embedded in it. This means that when learners achieve the unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 4.

General information for learners

Unit title: Building Services Engineering: Introduction to Energy (National 4)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This unit will introduce you to the main types of energy and their sources as well as energy conservation in households. You will learn how to:

- Describe the main types, sources and operating principles of energy and the reasons for reducing carbon emissions from households.
- Explain the methods and types of energy conservation and how to safely dispose of waste materials.

You do not need to have any previous qualifications or experience, but it would help if you have already finished, or are in the process of finishing, the following units:

- *Building Services Engineering: Introduction to Safe Working Practices* (National 4)
- *Building Services Engineering: Introduction to Science* (National 4)
- *Building Services Engineering: An Introduction* (National 4)
- *Building Services Engineering: Employability Skills* (National 4)

After you finish this unit, there may be opportunities to study other qualifications in this area, and/or further develop skills that will help in employment.

Administrative information

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Superclass: TH

History of changes to national unit specification

Version	Description of change	Date
2.0	Unit moved to a new template and re-coded to align with corresponding course 2 code. No change to unit content. Core Skill component Critical Thinking at SCQF level 4 embedded.	August 2018