National Unit specification

General information

Unit title: Energy efficiency in the built environment (SCQF level 6)

Unit code: HD70 46

Superclass: TH

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Source: Scottish Qualifications Authority

Version: 01

Unit purpose

This Unit will provide candidates with knowledge and understanding of the factors that affect energy efficiency in buildings, the causes of heat loss and excess moisture. The Unit will develop candidates' understanding of how factors such as building fabric, design and construction affect energy efficiency.

Outcomes

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

1. Identify how heat is lost from buildings and how these losses can be reduced.
2. Explain and identify causes, effects and ways of controlling moisture and air quality in buildings.
3. Identify and explain how building fabric affects energy efficiency.
4. Identify and explain the impact of design, method of construction and choice of materials on energy efficiency.

Credit points and level

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

Recommended entry to the Unit

Entry is at the discretion of the centre.

National Unit specification: General information (cont)

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

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

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award 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

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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 how heat is lost from buildings and how these losses can be reduced.

Performance Criteria

(a) Identify the Units for measuring thermal characteristics and their correct interpretation.
(b) Identify the areas of greatest heat loss from buildings.
(c) Identify building design features that minimise thermal losses.
(d) Identify ways of reducing heat loss from existing buildings.

Outcome 2

Explain and identify causes, effects and ways of controlling moisture and air quality in buildings.

Performance Criteria

(a) Identify activities that cause moisture and condensation in buildings.
(b) Explain the negative effects of moisture in buildings.
(c) Identify ways of controlling or reducing moisture in buildings.
(d) Identify the requirements of energy efficiency building standards and possible unintended impacts on air quality.

Outcome 3

Identify and explain how building fabric affects energy efficiency.

Performance Criteria

(a) Identify different types of building fabric.
(b) Explain what is meant by 'fabric first'.
(c) Identify the properties of building fabric that affect energy efficiency.
(d) Identify the energy efficiency benefits of improving building fabric.
(e) Explain why certain energy efficiency measures are better suited to some building types than others.

National Unit specification: statement of standards (cont)

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Outcome 4

Identify and explain the impact of design, method of construction and choice of materials on energy efficiency.

Performance Criteria

(a) Explain what is meant by ‘design performance gaps’.
(b) Identify how the behaviours of building users can cause design performance gaps.
(c) Explain what ‘embodied energy’ means in relation to building materials.
(d) Explain why energy efficiency measures might only be effective when used as a package or in combination.
(e) Identify the different building systems where efficiency savings can be made.

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 this Unit to the standard specified in the 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 1–4 to demonstrate that the candidate has achieved all the Outcomes and Performance Criteria.

In terms of the specific Outcomes of this Unit:

Outcome 1: Written and/or oral evidence

Candidates must be able to identify:

- the Units for measuring energy efficiency and the difference between them, including: K-value (thermal conductivity); U-value (thermal transmittance); R-value (thermal resistance).
- the areas of greatest heat loss from buildings: roof/loft and windows.
- building design features that minimise thermal losses: building orientation; window size and location/use of 'day lighting'; window shading/use of heat deflecting technologies; use of heat-absorbing or heat-reflecting materials
- the ways of reducing heat loss in existing buildings, including: sealing drafts around skirting, roofing joins, around windows and door frames; insulation; double glazing.

Outcome 2: Written and/or oral evidence

Candidates must be able to identify:

- the causes of moisture and condensation in buildings, including: cooking, washing, drying, perspiration, breathing.
- the requirements of energy efficiency building standards and possible unintended impacts on air quality: air-tightness; increase in indoor airborne pollutants; mould growth; overheating; condensation.

Candidates must be able to explain:

- the negative effects of moisture in buildings, including: mould, mildew, dampness; ill health (asthma, rheumatism).
- identify ways of controlling or reducing moisture, including: adequate heating; ventilation and insulation; heat-recovery; extraction.

National Unit specification: statement of standards (cont)

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Outcome 3: Written and/or oral evidence

Candidates must be able to identify:

- different types of building fabric, including: ceilings, walls, windows, floors and doors of a building.
- energy efficiency benefits of improving building fabric, including: reduced energy costs from loss of heated air; better temperature control; lower expenditure on heating systems — ie smaller capacity required; increasing property value for re-sale; regulatory compliance.
- the properties of building fabric that affect energy efficiency: breathability and permeability.

Candidates must be able to explain:

- why certain energy efficiency measures are better suited to some building types: restrictions in/on Listed Buildings; building defects; different methods of construction/building fabric.

Outcome 4: Written and/or oral evidence

Candidates must be able to explain:

- the concept of design performance gaps; that assumptions made at design stage do not always reflect actual building use; that actual use of energy might exceed what would be expected.
- the meaning of ‘embodied energy’ in relation to building materials: the energy required to create a product, taking into account all of the processes involved extracting/obtaining materials; manufacture; transport to site.

National Unit Support Notes

Unit title: Energy efficiency in the built environment (SCQF level 6)

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

This Unit should be considered an introduction to energy efficiency. It introduces candidates to the concept of energy efficiency and the importance of adopting energy efficient working practices.

It has been designed to provide underpinning knowledge which can be applied in a range of contexts in the built environment and by a range of trades.

The Unit can be delivered in combination with the development of key occupational skills and practical experience in various built environment contexts. The subject could be introduced by emphasising the importance of energy efficiency to sustainability and low carbon, and emphasising the benefits to the consumer, and the environment, of minimising energy consumption.

Delivery could incorporate a variety of teaching and learning approaches, including:

- Online delivery
- Tutor presentations
- Group work and discussions
- Tutor demonstration
- Simulated activities
- Visits to construction sites
- Video presentations
- Visiting speakers
- Handouts
- Individual and group research
- Reflection

National Unit specification: Support Notes (cont)

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Guidance on approaches to delivery of 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.

An integrated approach to learning and teaching across the Outcomes in this Unit, and relevant others, is suggested. Particularly with Unit xxx '*The importance of energy efficiency'*; Unit xxx '*Principles of energy efficient building*'.

Guidance on approaches to assessment of this Unit

In order to achieve this Unit, candidates are required to present sufficient evidence that they have met all the Performance Criteria for each Outcome within the range specified. Details of these requirements are given for each Outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrated approach to assessment is encouraged.

A holistic approach should be employed where appropriate. Links with other Units should be highlighted where possible.

A variety of assessment methods could be used, such as:

- Structured questioning under closed-book conditions.
- Developing case studies.
- Individual or group project.
- Research-based assignment.

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.

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**.

National Unit Support Notes (cont)

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Opportunities for developing Core and other essential skills

Throughout this Unit there may be opportunities for candidates to develop the Core Skill of *Communication* at SCQF level 6. This may be possible whilst the candidate is describing and explaining the responses during the assessment process.

History of changes to Unit

Version	Description of change	Date