



National Unit specification: general information

Unit title: Land-based Engineering: An Introduction: Sustainability (SCQF level 5)

Unit code: H1MS 11

Superclass: SK

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Version: 01

Summary

The purpose of this Unit is to develop the candidate's knowledge and skills in working with land-based vehicles and machinery in a sustainable manner. Candidates will learn about their environmental responsibilities, waste management, energy sources and the efficient use of energy in land-based engineering. This Unit is suitable for candidates who wish to enter apprentice training to be engineering technicians working on land-based vehicles and equipment. This is an optional Unit in the National Certificate in Land-based Engineering: An Introduction at SCQF level 4. It is also available as a freestanding Unit.

Outcomes

- 1 Describe the environmental responsibilities of the land-based engineering industries.
- 2 Describe the management of waste produced by the land-based engineering sector.
- 3 Describe sources of energy for the land-based industries.
- 4 Describe the efficient use of energy in land-based engineering applications.

Recommended entry

Entry is at the discretion of the centre.

Credit points and level

1 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.*

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 of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components 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

Describe the environmental responsibilities of the land-based engineering industries.

Performance Criteria

- (a) Identify the current legislation which controls the environmental impact of land-based engineering.
- (b) Identify the role of land-based engineering in relation to sustainable food production.
- (c) Describe the responsibilities of land-based engineering employers and employees to customers and the general public.
- (d) Identify the sources of potential impact on the environment from land-based engineering activities.

Outcome 2

Describe the management of waste produced by the land-based engineering sector.

Performance Criteria

- (a) Identify types of waste produced by the land-based engineering sector.
- (b) Describe the correct storage, handling and disposal of waste.
- (c) Describe recycling procedures for waste products.

Outcome 3

Describe sources of energy for the land-based industries.

Performance Criteria

- (a) Identify non-renewable sources of energy.
- (b) Identify renewable energy sources.
- (c) Identify sources of energy suitable for land-based vehicles.

Outcome 4

Describe the efficient use of energy in land-based engineering applications.

Performance Criteria

- (a) Describe the efficient use of energy in land-based engineering activities.
- (b) Identify methods of improving the efficiency of land-based engineering activities.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

Evidence is required to demonstrate that the candidates have achieved all of the Outcomes and Performance Criteria. Evidence can be produced holistically or Outcome by Outcome.

Written and/or recorded oral evidence must be produced in supervised closed-book conditions. Candidates must:

Outcome 1

- ◆ Identify four aspects of environmental legislation which impact on land-based engineering (LBE)
- ◆ Outline the role of land-based engineering in relation to sustainable food production
- ◆ Identify four environmental responsibilities of employers and employees in the LBE industry in relation to their customers and the general public
- ◆ Identify eight sources of potential environmental hazards within the immediate work area including at least one from each of the following:
 - the servicing of land-based equipment
 - working on chemically and /or biologically contaminated machinery
 - working with substances hazardous to health
 - removing fumes, dust, hazardous gases and vapours
 - release of stored gas pressure

Outcome 2

- ◆ Identify six types of waste produced by the land-based engineering industries
- ◆ State four methods of storing environmentally sensitive materials
- ◆ State four methods of handling and using environmentally sensitive materials
- ◆ State two methods of disposing of surplus or waste environmentally sensitive materials
- ◆ State six materials commonly recycled in the land-based engineering sector and the correct recycling process for each

Outcome 3

- ◆ Identify six sources of renewable energy
- ◆ Identify four sources of non-renewable energy
- ◆ For two of the named sources of energy, state their suitability for land-based vehicles

Outcome 4

- ◆ Identify two aspects of energy efficiency which affect environmental impact of land-based engineering operations
- ◆ State two methods of improving efficiency in the use of energy

National Unit specification: support notes

Unit title: Land-based Engineering: An Introduction: Sustainability (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

This Unit is designed to allow the candidate to gain knowledge and understanding of the issues underpinning the efficient use of energy and a sustainable environment. The Unit can be integrated with other Units in the National Certificate in Land-based Engineering: An Introduction at SCQF level 4.

This Unit is aligned to the following Lantra Sector Skills Council's National Occupational Standards (NOS):

- ◆ Unit LEO 1 Recognise and reduce hazards in the land-based engineering work area
- ◆ Unit LEO 2 Organisational procedures in land-based engineering

The Unit introduces the candidate to the purpose, application and relevance of: renewable energy and efficient use of power within the land-based industry.

A study of transport should include fuel efficient driving and field operations the use of electric powered vehicles. Energy production for industry and home by solar panels PV, wind power, water including hydro-electric, tidal and wave energy, air source heat pumps, ground source heat pumps, micro-CHP (combined heat and power), bio-mass/wood fuelled heating. Current policy on 'feed in tariffs', renewable heat incentives, carbon capture and insulation measures.

Environmental protection and obligations of land-based engineering to the environment in a land-based context, including an awareness of environmental issues and how to reduce their impact during work activities. Sustainable work practices that reduce and minimise the risk of environmental damage should be encouraged including the selection of non-toxic substances. This should include cleaning of chemical application machinery, recovery of oils, refrigerants and fuels and materials such as liquid ballast. The handling and storage of environmentally sensitive materials, chemical cleaners, fuels, gases, lubricants, paints, thinners, battery acid, coolants and the disposal of different types of potentially harmful substances and gases.

Emphasis should be placed on work practices, which reduce the risk of environmental damage, including the cleaning of chemical application machinery, recovery of oils and fuels, liquid ballast, selection of non-toxic substances and recovery of refrigerants.

Candidates should be able to differentiate between toxic and non-toxic waste, recyclable materials and non-recyclable materials methods of disposal.

National Unit specification: support notes (cont)

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The duties of employers and employees to take environmental responsibility with regard to sustainable and energy work practices and maintenance of the working environment. The duties of employees to take reasonable care in their work with regard to sustainability and energy usage which may be affected by their acts or omissions and co-operating with their employers and customers.

Guidance on learning and teaching approaches for this Unit

The issues covered should be an overview and not an in-depth study of each piece of legislation.

Government agencies and land-based engineering bodies publish a useful selection of guidelines and pro-formas, as well as materials which can be used if access to an actual workplace is impractical. These could be made readily available to students for both delivery and assessment purposes. It is important to ensure that the documentation used is current. Candidates should have the opportunity to access and research the internet on the current legislation and any amendments with respect to European Directives.

This Unit should be delivered by a combination of teaching and learning approaches which could include: classroom delivery, case studies, practical activities, group discussions, tutorials, directed study, investigations using ICT, site visits, audio visual materials, guest speakers.

Guidance on approaches to assessment for this Unit

Outcomes 1, 2 and 3

Assessment may be by use of a structured question/restricted response paper. This assessment may be suitable for on-line delivery.

Outcome 4

Assessment could be written or oral questioning related to a case study/scenario — task instruction sheets, manufacturer's product literature and record forms should be made available to candidates.

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 social software. 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)*.

National Unit specification: support notes (cont)

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Opportunities for developing Core Skills

Candidates will:

- ◆ assess the environmental responsibilities of the land-based engineering industries
- ◆ describe the management of waste material produced by the land-based engineering sector
- ◆ recognise sources of energy for the land-based industries
- ◆ identify efficient use of energy in land-based engineering applications

This means that as candidates are doing this Unit they will be developing aspects of the Core Skills of *Communication, Information and Communication Technology (ICT), Problem Solving, Working with Others and Numeracy*.

Whilst completing this Unit, candidates may develop aspects of the following Core Skills where specific learning and teaching approaches are adopted:

Information and Communication Technology (ICT) may be developed in the Unit where candidates may access, research and identify information pertinent to land based engineering applications.

Communication may be developed where detailed written and oral communications are used.

Numeracy may be developed where energy calculations are considered and graphical information is interpreted.

Problem Solving can be developed in group discussion of recycling materials and measures for promoting and implementing working practices and when considering the handling: use and the disposal of environmentally sensitive materials.

Working with Others may be developed in practical situations where team working is encouraged.

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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