National Unit Specification: general information

UNIT Energy: Conventional Technologies and the Grid (Intermediate 2)

CODE F3FV 11

COURSE Energy (Intermediate 2)

SUMMARY

This is an optional Unit of the Intermediate 2 Skills for Work Energy Course. This Unit can also be taken as a stand-alone Unit.

Candidates will investigate how conventional energy generation plants support the UK's total energy needs, and review the effect each of them has on the environment. They will investigate systems used to generate electricity using coal, oil, gas, hydro, and nuclear energy as a power source. The national grid and the distribution of energy/power will be investigated from both present and projected future needs.

This Unit has been designed with secondary school candidates in mind but is also suitable for a wide range of candidate groups.

OUTCOMES

1 Investigate conventional energy systems in accordance with a given brief.
2 Investigate electricity transmission and distribution through the national grid system in accordance with a given brief.
3 Present findings on own energy consumption according to a given brief.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

Administrative Information

Superclass: QB

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Source: Scottish Qualifications Authority

Version: 01

National Unit Specification: general information (cont)

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CREDIT VALUE

0.5 credit at Intermediate 2 (3 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.*

CORE SKILLS

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

Opportunities for developing aspects of Core Skills are highlighted in *Guidance on Learning and Teaching Approaches for this Unit.*

National Unit Specification: statement of standards

UNIT Energy: Conventional Technologies and the Grid (Intermediate 2)

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

Investigate conventional energy systems in accordance with a given brief.

Performance Criteria

(a) Gather relevant information from a variety of sources according to the given brief.
(b) Gather information on the contribution of selected energy systems to the UK.
(c) Gather information on the environmental effects of selected energy systems.
(d) Organise information gathered to produce clear summaries on the energy contribution and environmental effects of conventional energy systems.
(e) Check that all steps have been completed in accordance with the given brief, including completing the work to the agreed timescale.

OUTCOME 2

Investigate electricity transmission and distribution through the national grid system in accordance with a given brief.

Performance Criteria

(a) Gather relevant information from a variety of sources according to the given brief.
(b) Gather information on ways of transmitting electricity through the national grid.
(c) Gather information on ways of distributing electricity to the consumer.
(d) Gather information on the environmental issues raised when using a national grid system.
(e) Organise information gathered to produce clear summaries on the transmission and distribution of electricity, including environmental effects.
(f) Check that all steps have been completed in accordance with the given brief, including completing the work to the agreed timescale.

OUTCOME 3

Present findings on own energy consumption according to a given brief.

Performance Criteria

(a) Present clear summary information on the contribution of conventional energy systems.
(b) Present clear summary information on the environmental effects of conventional energy systems.
(c) Present clear summary information on the transmission and distribution of electricity.
(d) Present clear summary information on the environmental issues of the national grid.

EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate the candidates have achieved all Outcomes and Performance Criteria.

Performance and product evidence is required for this Unit. The evidence should be gathered at appropriate points throughout the Unit, in open-book conditions, in response to a given brief.

Performance and product evidence

Candidates will carry out an individual investigation according to the instructions in a given brief which covers all Outcomes and Performance Criteria. Findings will be gathered in a folio which the assessor will discuss with the candidate to check that all steps have been carried out as specified. The assessor will then complete and retain an observation checklist for each candidate as evidence that all steps have been carried out as specified in the brief.

Product evidence

Each candidate will produce a presentation which meets the Performance Criteria in Outcome 3. The method of communication in the presentation may be chosen by the candidate — written/oral, diagrammatic, graphical, and electronic — are all acceptable. The candidate may also choose different forms of communication — poster, leaflet, short talk, PowerPoint presentation — are all acceptable, provided the Performance Criteria are met.

An assessor checklist identifying the critical aspects of the presentation, regardless of form, should be completed and retained for each candidate. The critical aspects are:

- summary information must be clear
- summary information of the contribution of convention energy systems to the UK
- summary information on the environmental effects of conventional energy systems
- summary information on the transmission of electricity
- summary information on electricity distribution systems
- summary information on the environmental effects of the national grid

Summary information of the contribution of convention energy systems must cover three of the following; coal power, oil power, gas power, hydro power or nuclear power.

Summary information on the environmental effects for conventional energy systems should include, where appropriate; carbon emissions, sustainability of fuel, fuel pipe lines, waste products, radiation, wildlife, climate change, or health.

Summary information on transmission lines should include; cables, pylons, underground cables, efficiencies, and high voltages.

Summary information on distribution systems should include; supply transformer stations, step down voltages (133kV or 110kV), distribution to consumers (230V), and domestic uses.

National Unit Specification: statement of standards (cont)

UNIT Energy: Conventional Technologies and the Grid (Intermediate 2)

The National Assessment Bank (NAB) item for this Unit contains an appropriate brief which covers the investigation and presentation requirements of the Unit and an assessor observation checklist. Centres wishing to devise their own assessments must refer to the NAB to ensure a comparable standard.

National Unit Specification: support notes

UNIT Energy: Conventional Technologies and the Grid (Intermediate 2)

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 20 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

The *Energy: Conventional Energy Production and the Grid* Unit has been designed to provide candidates with an introduction to the size and relevance of the conventional energy power generation sector in the UK, and how the national grid is used to transmit this electrical power to the domestic market. Issues that arise from these generation and transmission technologies are also investigated. The focus of this Unit is on the investigation skills that the candidate will use to access and organise relevant information, and finally, to present their findings in a clear format.

This Unit should give candidates the opportunity to determine the importance of conventional power systems to the total energy used in the UK. They will also gain an understanding of the environmental issues linked to each of the energy systems, from CO_2 emissions to the disposal of waste products.

The transmission and distribution of electricity using the national grid will be investigated to give candidates an understanding of how domestic electricity is distributed to the consumer.

The national grid should be evaluated in terms of it meeting the needs of the UK today and in the future. Renewable energy systems will come into consideration when looking at the future of the national grid, ie generating large amounts of electrical power in remote locations, eg off-shore wind farms, and not having power lines to transmit the power to where the main population in Scotland is. Candidates will also consider the environmental effects of the national grid and investigate the effect of any changes anticipated for it.

The following is a guide to the content in this Unit:

- Total UK energy produced:
  - individual technologies
  - energy produced for:
    - coal power
    - oil power
    - gas power
    - hydro power
    - nuclear power

- Environmental issues:
  - carbon emissions
  - depletion of fuel available
  - fuel pipe lines
  - electricity power lines
  - waste products
  - radiation
  - wildlife
  - climate change
  - health

- The national grid:
  - aluminium cables
  - steel cores
  - pylons
  - underground cables
  - efficiencies
  - high voltages

- Transmission and distribution:
  - supply transformer stations
  - step down voltage (132kV or 110kV)
  - distributed to consumers
  - step down voltage (230V)
  - domestic uses

- Grid environmental issues:
  - overhead power lines, pylons, large pylons, cost, maintenance, aesthetics
  - underground cables, insulation, cost, maintenance, aesthetics

The generic employability skills which are developed in this Unit are:

- maintaining good timekeeping and attendance
- seeking feedback and advice
- checking quality of work
- working to agreed deadlines
- organising work effectively
- working confidently
- working independently
- developing investigation skills
- developing presentation skills
- developing creativity skills

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

It is recommended that a thorough induction is given to candidates at the start of this Unit so that they understand that the main learning approach will be candidate-centred. Candidates should work independently on a given investigation brief and should develop and use skills in accessing and organising information from a variety of sources. Sources might include:

- family and friends
- manufacturer's instructions
- internet
- reference books
- visiting speakers

It is envisaged that some tutor support is given to candidates in the initial stages and at regular intervals throughout this Unit. However, the intention is to encourage candidates to work as independently as possible.

Candidates will be given responsibility, following lecturer/teacher support, for making choices on the format and style of the presentation of their key findings.

The candidate will be central to the learning and teaching of this Unit. They should be proactive in detailing the raw fuels/materials used to generate power and the refining processes they may need to undergo to make them suitable for use. Also in the size of the total power generated by conventional power stations, comparing these values, and evaluating how dependent we are on each of these technologies, and gaining an understanding of the environmental issues connected to each of the energy generation technologies.

They will also be proactive in investigating why a national grid is used to distribute power around the UK, and investigate the environmental issues connected with having a national grid, and any effects that a future national grid could have.

When candidates are presenting their findings in this Unit, there are good learning opportunities for the whole class group. The sharing of information and the different methods used for presentations provide useful opportunities for reflection and discussion. The assessment process itself can be used as a valuable part of the learning in the Unit.

Where this Unit is delivered as part of the Intermediate 2 Energy Course, there are good opportunities to integrate the practical skills with the development and assessment of generic employability skills in the *Energy: Employability and Careers* Unit. The candidate's review of progress in employability skills could be based on the practical activities carried out in this Unit.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

In this Unit there are good opportunities for candidates to develop the Core Skill of *Information Technology*:

- in the investigation of the size and value of conventional power and using a national grid system
- in the use of ICT to present findings

There are opportunities to develop aspects of the Core Skill of *Communication* both in the investigation and presentation of findings.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

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 communications 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).*

National Unit Specification: support notes (cont)

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Formative assessment exercises involving candidates in identifying the size and value of the energy produced through conventional power stations and the use of a national grid system, will play an important part in building up the candidate's knowledge, understanding, and confidence in relation to this Unit.

The recommended approach to summative assessment in this Unit is as follows:

Outcomes 1 and 2

Candidates will carry out an investigation according to a given brief. In doing this, they will gather their findings in a folio which will be used as the basis for a discussion between the assessor and the candidate. The assessment evidence will be the completed signed assessor observation checklist which will detail the essential steps in the process as expressed in the Performance Criteria.

Outcome 3

The assessment is based on the end product of the Outcome which will be a presentation in a form of the candidate's choosing. Forms of presentation might include, for example, a short talk, poster, leaflet, diagram, or PowerPoint presentation.

An assessor checklist identifying the critical aspects of the presentation, regardless of form, should be completed and retained for each candidate.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* **(www.sqa.org.uk)**.