



## **National Unit specification: general information**

**Unit title:** Offshore Renewable Energy Systems (SCQF level 5)

**Unit code:** FV2X 11

**Superclass:** QB

**Publication date:** September 2011

**Source:** Scottish Qualifications Authority

**Version:** 02

### **Summary**

This Unit may form part of the National Certificate in Engineering Systems (SCQF level 5) and can also be taken as a free-standing Unit.

This Unit will provide candidates with the necessary knowledge and understanding of the concepts and principles of offshore renewable energy systems. These concepts and principles will be in the context of offshore wind, wave and tidal systems and include engineering as well as non engineering topics.

The Unit is particularly suitable for those candidates wishing to embark upon a career in renewable energy engineering, related technology and general engineering.

### **Outcomes**

- 1 Demonstrate an understanding of the generation, storage and transfer of electricity created using offshore renewable energy.
- 2 Demonstrate knowledge and understanding of the environmental impact of implementing offshore renewable energy systems.
- 3 Investigate and identify an appropriate offshore renewable energy system for a given location.

### **Recommended entry**

While entry is at the discretion of the centre, candidates would normally be expected to have attained a minimum of a general grade in one science, mathematics or technology based Standard Grade as well as a minimum of a general grade in Standard Grade English or relevant equivalent qualifications.

## **General information (cont)**

**Unit title:** Offshore Renewable Energy Systems (SCQF level 5)

### **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.*

### **Core Skills**

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

- ◆ Critical Thinking at SCQF level 5

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

## **National Unit specification: statement of standards**

**Unit title:** Offshore Renewable Energy Systems (SCQF level 5)

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**

Demonstrate an understanding of the generation, storage and transfer of electricity created using offshore renewable energy.

#### **Performance Criteria**

- (a) Identify the key elements of the generation, storage and transfer of electricity created using offshore wind power.
- (b) Identify the key elements of the generation, storage and transfer of electricity created using wave power.
- (c) Identify the key elements of the generation, storage and transfer of electricity created using tidal power.

### **Outcome 2**

Demonstrate knowledge and understanding of the environmental impact of implementing offshore renewable energy systems.

#### **Performance Criteria**

- (a) Describe the environmental impact of implementing offshore wind power systems.
- (b) Describe the environmental impact of implementing wave power systems.
- (c) Describe the environmental impact of implementing tidal power systems.

### **Outcome 3**

Investigate and identify an appropriate offshore renewable energy system for a given location.

#### **Performance Criteria**

- (a) Carry out an investigation of the implementation of a suitable offshore renewable system.
- (b) Produce a record of the investigation.
- (c) Identifies the most viable system to employ in accordance with the results of the investigation.

## **National Unit specification: statement of standards (cont)**

**Unit title:** Offshore Renewable Energy Systems (SCQF level 5)

### **Evidence Requirements for this Unit**

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

Written and/or recorded oral evidence supplemented with performance evidence for part of Outcome 3 which demonstrates that the candidate has achieved all Outcomes to the standards specified in the Outcome and Performance Criteria.

This evidence should be produced under supervised, controlled conditions at appropriate points throughout the Unit either on an Outcome by Outcome basis or as integrated assessments.

The required evidence, for all Outcomes, is as follows:

#### **With regard to Outcome 1 — Written and/or Oral Evidence**

Written and/or oral evidence is required to show the candidate has demonstrated an understanding of the generation, storage and transfer of electricity created using offshore renewable energy, and include the following points:

- ◆ With regard to wind power the description must include:
  - Main features of a wind device, eg horizontal or vertical axis wind turbine.
- ◆ With regard to wave power the description must include:
  - The need for sufficiently consistent high energy waves to generate a viable wave resource.
  - Main features of a wave device, eg oscillating water column, point absorber, etc.
- ◆ With regard to tidal power the description must include:
  - The need for sufficiently strong tidal flows in order to generate a viable tidal resource.
  - Main features of one tidal device, either a kinetic energy or potential energy device.
- ◆ General points for all three to include array configurations, energy storage, connection to national grid considerations and maintenance.

#### **With regard to Outcome 2 — Written and/or oral evidence**

Written and/or oral evidence is required to show the candidate has demonstrated knowledge and understanding of the environmental impact of implementing offshore renewable energy systems by generating appropriate responses that include the following:

- ◆ Effect on marine birds, mammals, fish and shellfish
- ◆ Shipping and navigation
- ◆ Benthic ecology
- ◆ Commercial fisheries
- ◆ Seascape and recreation and leisure
- ◆ Onshore grid connections

## **National Unit specification: statement of standards (cont)**

**Unit title:** Offshore Renewable Energy Systems (SCQF level 5)

### **With regard to Outcome 3 — Performance and Written and Oral Evidence**

Performance evidence supported by written and/or oral evidence is required to demonstrate that the candidate has completed an investigation to the standard identified in the Outcome and Performance Criteria. The evidence generated should be based on a specified geographic location and include the following:

- ◆ Comparison of each of the three methods (offshore wind, wave and tidal)
- ◆ Cost (installation and maintenance)
- ◆ Efficiency and environmental impact (effect on marine birds, mammals, fish and shellfish, shipping and navigation, benthic ecology, commercial fisheries, seascape and recreation and leisure, onshore grid connections)
- ◆ Identification of the most viable system to implement

## **National Unit specification: support notes**

**Unit title:** Offshore Renewable Energy Systems (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 aim of this Unit is to provide candidates with an introduction to offshore renewable energy principles that may be employed within an engineering system context and has been designed to provide an equal treatment to engineering and non engineering aspects.

On successful completion of the Unit candidates will have developed the knowledge, understanding and skills to assess the impact of employing offshore renewable energy systems including both engineering and environmental considerations.

Centres may choose to employ different sources of geographic data throughout the delivery of this Unit dependent upon centre resources and candidate requirements.

### **Guidance on learning and teaching approaches for this Unit**

It is recommended that the Unit is delivered by a series of investigations developed from the statement of standards section of the Unit. This will include candidates investigating marine offshore renewable energy, or sub-systems, to study their principles of operation. If appropriate, centres may wish to allow candidates to perform experiments on systems, or sub-systems, by integrating the Outcomes and related PC's for this Unit with the Outcomes and related PC's for other relevant Units.

It is intended that this Unit should be delivered as much as possible with reference to actual industry practices and processes. With this in mind, it would be beneficial if candidates had access to industrial examples of offshore renewable energy systems.

Tutorial delivery methods include a variety of teaching methods which will enhance the learning experience, including face to face tutorials, field trips, group discussion and networking candidates, industrial experience and expertise, visiting industry specialists, work related project activities, etc.

### **Guidance on approaches to assessment for this Unit**

The Evidence Requirements are best generated by candidate submitting a portfolio of accurate responses gained from investigations. Centres will need to issue candidates with suitable portfolios containing relevant information with regard to necessary evidence and any other essential information.

Outcome 1 could be assessed using short response questions and recommending the use of block diagrams as part of the candidate's responses.

Outcomes 2 and 3 could be assessed by candidates producing a report based on a given task provided by the centre.

## **National Unit specification: support notes**

**Unit title:** Offshore Renewable Energy Systems (SCQF level 5)

### **Opportunities for the use of e-assessment**

In the event of any centre wishing to deliver this Unit on a fully open learning basis, then it would be highly desirable that prospective candidates have access to offshore renewable energy systems and work experience to enable them to undertake this course.

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)*.

### **Opportunities for developing Core Skills**

As this Unit requires candidates to complete reports, draw accurate diagrams and to carry out investigations as well as make scientific comparisons, there may exist opportunities to develop Core Skills in *Communication, Problem Solving* and *Numeracy*.

For all three Outcomes the candidates will have to investigate and analyse a range of requirements and determine needs, while working out a best fit solution.

### **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](http://www.sqa.org.uk/assessmentarrangements)

## History of changes to Unit

Version	Description of change	Date
02	Core Skills Component Critical Thinking at SCQF level 5 embedded.	29/09/2011

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