Qualification Specification:

OCN NI Level 5 Award in Green Technologies

- **Qualification No: 610/0594/0**

OCN NI Level 5 Certificate in Green Technologies

- **Qualification No: 610/0593/9**

OCN NI Level 5 Extended Certificate in Green Technologies

- **Qualification No: 610/0592/7**

1. Specification Updates

Key changes have been listed below:

Section	Detail of change	Version and date of Issue
Specification	New Format	V2.0 – May 2026
Qualification	Extended to 28 February 2032	V2.0 – May 2026

2. Contents

3. Introduction to Open College Network Northern Ireland (OCN NI)

The Open College Network Northern Ireland (OCN NI) is a UK recognised awarding organisation based in Northern Ireland. We are regulated by CCEA Regulation to develop and award regulated professional and technical (vocational) qualifications from Entry Level up to and including Level 5 across all sector areas. In addition, OCN NI is also regulated by Ofqual to award qualifications in England.

OCN NI is also an educational charity that advances education by developing nationally recognised qualifications and recognising the achievements of learners. We work with centres such as Further Education Colleges, Private Training Organisations, Voluntary & Community Organisations, Schools, SME's and Public Sector bodies to provide learners with opportunities to progress into further learning and/or employment. OCN NI's Strategic Plan can be found on the OCN NI website www.ocnni.org.uk.

For further information on OCN NI qualifications or to contact us, you can visit our website at www.ocnni.org.uk. The website should provide you with details about our qualifications, courses, contact information, and any other relevant information you may need.

OCN NI Contact Details

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4. About this Specification

This specification details OCN NI's specific requirements for the delivery and assessment of the **OCN NI Level 5 Award, Certificate and Extended Certificate in Green Technologies.**

This specification will provide guidelines for centres to ensure the effective and correct delivery of these qualifications. OCN NI qualification specifications are based on research and engagement with the practitioner community to ensure they provide appropriate skills and knowledge for learners.

The qualification specification will detail the following aspects of the OCN NI Level 5 Award, Certificate and Extended Certificate in Green Technologies

- **Qualification Features**: this includes the key characteristics and features of these qualifications, such as their intended audience, purpose, and credit value.

- **Centre Requirements:** this details the prerequisites and obligations that centres must fulfil to be eligible to deliver and assess these qualifications. These include guidelines on staff qualifications, resources, and required procedures.

- **Structure and Content:** this details the structure and content of the qualifications including units, and any specific content that learners will be required to study.

- **Assessment Requirements:** this details assessment criteria and assessment methods for these qualifications, ensuring that summative assessment approaches are clear.

- **Quality Assurance:** the quality and consistency of delivery and assessment of these qualifications are of paramount importance to OCN NI. The mandatory quality assurance arrangements including processes for internal and external quality assurance that all centres offering these qualifications must adhere to are detailed.

- **Administration:** guidance on the administrative aspects of delivering these qualifications, including registration, certification, and record-keeping.

- Reference to other handbooks and policies as appropriate to the qualifications.

It is important to note that OCN NI will communicate any significant updates or changes to this specification in writing to our centres. Additionally, we will make these changes available on our official website at www.ocnni.org.uk.

To stay current, please refer to the online version of this specification as it is the most authoritative and up-to-date publication. Be aware that downloaded and printed copies may not reflect the latest revisions.

4.1 Additional Support

OCN NI offers a comprehensive range of support services designed to assist centres in meeting the delivery and quality assurance requirements of OCN NI qualifications. These services include:

- **Learner Assessment Booklets**: These booklets are created to assist learners in demonstrating the fulfilment of assessment criteria and organising the quality assurance prerequisites for each individual unit.

- **Specimen Assessment Materials**: These booklets are created to assist learners in demonstrating the fulfilment of assessment criteria and organising the quality assurance prerequisites for each individual unit.

- **Qualification Support Pack**: A support pack has been developed to support centres in the delivery of these qualifications. The pack includes planning and assessment templates, guides to best practice, etc.

- **Professional Development for Educators**: OCN NI provides opportunities for professional development tailored to meet the various needs of practitioners and quality assurance staff. Centres can join our training sessions, available in both face-to-face and online formats, or explore a wealth of training materials by visiting www.ocnni.org.uk

- **OCN NI Subject Advisors**: Our team of subject advisors offers vital information and support to centres. They provide guidance on specification details, non-exam assessment advice, updates on resource developments, and various training opportunities. They actively engage with subject communities through an array of networks to facilitate the exchange of ideas and expertise, to support practitioners to provide quality education programs to learners.

All centres can access information, support and guidance to support the delivery and quality assurance of these qualifications by contacting their designated Business Development Advisor or by contacting us on Contact Us | OCN NI

5. About these Qualifications

5.1 Qualification Regulation Information

OCN NI Level 5 Award in Green Technologies
Qualification Number: 610/0594/0

OCN NI Level 5 Certificate in Green Technologies
Qualification Number: 610/0593/9

OCN NI Level 5 Extended Certificate in Green Technologies
Qualification Number: 610/0592/7

Operational start date: 15 March 2022
Review date: 28 February 2037

The qualifications' operational start and end dates define the regulated qualifications' lifecycle. The operational end date is the final date for learner registration, while learners have until the certificate end date to complete the qualifications and receive their certificates.

It is important to note that all OCN NI regulated qualifications are listed on the Register of Regulated Qualifications (RQF), which can be found at Ofqual Register. This register is maintained by Ofqual in England and CCEA Regulation in Northern Ireland. It contains information about qualifications that are regulated and accredited. It is a key resource for learners, employers, and educational institutions to verify the status and recognition of qualifications.

Centres must adhere to administrative guidelines diligently, with special attention to the fact that fees, registration, and certification end dates for the qualification may be subject to changes. It is a centre's responsibility to make itself aware of updates on any modifications to ensure compliance with the latest requirements. OCN NI provides centres with timely updates through various channels including website, newsletters and through this specification. Information on qualification fees can be found on the Centre Login section of the OCN NI website www.ocnni.org.uk .

5.2 Sector Subject Area

A subject sector area is a specific category used to classify academic and vocational qualifications. Subject sector areas are part of the educational and qualifications framework to organise and categorise qualifications. The sector subject for these qualifications is:

Subject Area: 5.2. Building and Construction

NOS: NOS - BSESPV06 - Solar PV and EESS

Solar PV	**INSPV1–4, INSEA5**
Solar Thermal	**INSSH1–3, INSEA5**
Heat Pumps	**INSHPM1–4, EUSL4**
Wind Power	**PWEGEN1–3, INSEA5**
Off-Grid Systems	**INSPV, PWEGEN, MEEES**
Energy Storage	**MEEES1–3, INSEA5**
EV Charging	**EEVES1–3, EUSL4**
Hydrogen	**CHEMOPS, ESGEN**
Anaerobic Digestion	**ADPROC1–4, WASTEOPS**
Biofuels	**BIOFUEL1–3, CHEMOPS**

5.3 Grading

Grading for these qualifications is pass/fail.

5.4 Qualifications' Aim and Objectives

Qualifications' Aim

The aim of the OCN NI Level 5 Award, Certificate and Extended Certificate in Green Technologies is to provide individuals with an understanding of the application of green technologies including installation practices and processes.

Qualifications' Objectives

The objectives of the OCN NI Level 5 Award, Certificate and Extended Certificate in Green Technologies are to enable learners to understand:

- solar photovoltaic systems
- anaerobic digestion
- solar thermal decarbonisation of hot water systems
- electrical vehicle charging systems
- ground and air source heat pumps
- hydrogen production systems and technologies
- sustainable alternative biofuels
- electrical energy storage systems

5.5 Target Learners

These qualifications are targeted at individuals who wish to develop skills and knowledge in the areas of green technologies. Learners would be expected to have experience within the construction industry and be interested in the application of green technologies within the built environment.

5.6 Entry Requirements

Learners must be at least 18 years of age have a level 3 qualification or at least five years' experience in the construction and related industries. Learners must also meet all regulatory and statutory licensing and standards where appropriate in order to perform practical activities governed by the regulations within the qualifications.

5.7 Progression

The OCN NI Level 5 Award in Green Technologies will allow learners to progress to the OCN NI Level 5 Certificate and Extended Certificate in Green Technologies. From there learners may progress to higher level qualifications in the area of environmental conservation and green technologies or into employment.

5.8 Delivery Language

These qualifications are exclusively available in English. If there is a desire to offer these qualifications in Welsh or Irish (Gaeilge), we encourage you to get in touch with OCN NI. They will assess the demand for such provisions and, if feasible, provide the qualification in the requested language as appropriate.

6. Centre Requirements for Delivering these Qualifications

6.1 Centre Recognition

New and existing OCN NI recognised centres must apply for and be granted approval to deliver these qualifications prior to the commencement of delivery.

6.2 Qualification Approval

Once a centre has successfully undergone the Centre Recognition process, it becomes eligible to apply for qualification approval. The centre's capability to meet and sustain the qualification criteria will be assessed. Throughout the qualification approval process, OCN NI will aim to ensure that:

- centres possess suitable physical resources (e.g., equipment, IT, learning materials, teaching rooms) to support qualification delivery and assessment
- centre staff involved in the assessment process have relevant expertise and/or occupational experience
- robust systems are in place for ensuring ongoing professional development for staff delivering the qualifications
- centres have appropriate health and safety policies concerning learner equipment use
- qualification delivery by centres complies with current equality and diversity legislation and regulations
- as a part of the assessment process for these qualifications it may be useful for learners to have access to a practical work setting

6.3 Centre Staffing

To offer these qualifications centres are mandated to establish the following roles as a minimum, although a single staff member may serve in more than one capacity*:

- Centre contact
- Programme Co-ordinator
- Assessor
- Internal Quality Assurance (IQA)

*Note: An individual cannot serve as an IQA for their own assessments.

6.4 Tutor Requirements

Tutors responsible for delivering these qualifications are expected to possess a high degree of occupational competency. They should meet the following criteria:

- **Occupational Competency:** Tutors should demonstrate a clear understanding of the subject matter, including up-to-date knowledge. They should also have a minimum of one year's relevant experience in this area. This competence should enable them to effectively impart knowledge and practical skills to learners.

- **Qualifications:** Tutors should hold qualifications at a level that is at least one level higher than the qualification they are teaching and have at least three years' industry experience in the specific green technology area they are teaching. This ensures that they have the necessary academic foundation to provide in-depth guidance and support to learners.

These requirements collectively ensure that learners receive instruction from highly qualified and experienced instructors, thereby enhancing the quality and effectiveness of their educational experience.

6.5 Assessor Requirements

The assessment of these qualifications takes place within the centre and is subjected to OCN NI's rigorous quality assurance procedures. The achievement of individual units is based on the criteria defined in each unit.

Assessors play a pivotal role in ensuring the validity and fairness of assessments. They are required to meet the following criteria:

- **Occupational Competency:** Assessors should possess a high degree of occupational competency in the relevant subject matter. This expertise enables them to accurately evaluate and measure a learner's knowledge and skills. Additionally, they should hold qualifications at a level that is at least one level higher than the qualification they are assessing, ensuring their in-depth understanding of the subject matter.

- **Assessment Expertise:** Assessors should be qualified to at least one level higher than the qualification and have at least three years' industry experience in the specific green technology area they are teaching. This includes knowledge of best practices in designing, conducting, and grading assessments. Their expertise ensures that assessments are both fair and valid.

- **Assessors Qualification:** Assessors should hold or be currently undertaking a recognised assessor's qualification; or must have attended the OCN NI Assessment Training.

- **Comprehensive Assessment Oversight:** Assessors are responsible for evaluating all assessment tasks and activities comprehensively. They must

thoroughly review and assess each element to ensure a fair and accurate representation of a learner's skills and knowledge.

These rigorous requirements uphold the quality and integrity of the qualification's assessment process, ensuring that learners receive a fair and reliable evaluation of their competencies.

6.6 Internal Quality Assurer Requirements

The Internal Quality Assurer plays a crucial role in the centre's internal quality assurance processes. The centre must designate a skilled and trained IQA who assumes the role of an internal quality monitor responsible for verifying the delivery and assessment of the qualifications.

The Internal Quality Assurer for these qualifications must meet the following criteria:

- **IQA Expertise:** IQA should have direct or related experience in the field of verification and have at least three years' industry experience in the specific green technology area they are teaching. This includes knowledge of best practices in designing, conducting, and grading assessments. Their expertise ensures that assessments are both fair and valid.
- **IQA Qualification:** IQA should hold or be currently undertaking a recognised IQA qualification; or must have attended the OCN NI IQA Training.
- **Thorough Evaluation of Assessment Tasks and Activities:** IQA are tasked with conducting in-depth reviews and assessments of all assessment tasks and activities. Their responsibility is to ensure a comprehensive and meticulous oversight of each element to guarantee a just and precise reflection of a learner's abilities and knowledge and to ensure that all assessment and quality assurance requirements are fulfilled.

7. Qualification Structure

7.1 Qualification Purpose

The OCN NI Level 5 Award, Certificate and Extended Certificate in Green Technologies are designed to provide learners with an understanding of the application of green technologies including installation practices and processes.

7.2 Qualification Level

In the context of the OCN NI Level 5 Award, Certificate and Extended Certificate in Green Technologies it is essential to understand the significance of qualification levels, as they play a pivotal role in assessing the depth and complexity of knowledge and skills required for successful attainment. These qualifications align with Level 5, which signify a advanced level of difficulty and intricacy. It's important to note that qualification levels in the educational framework range from Level 1 to Level 8, complemented by three 'entry' levels, namely Entry 1 to Entry 3.

7.3 Qualification Size

Total Qualification Time (TQT)

This represents the total amount of time a learner is expected to spend to complete the qualification successfully. It includes both guided learning hours (GLH) and independent study or additional learning time.

Guided Learning Hours (GLH)

These are the hours of guided instruction and teaching provided to learners. This may include classroom instruction, tutorials, or other forms of structured learning.

OCN NI Level 5 Award in Green Technologies	
Total Qualification Time (TQT):	70 hours
Total Credits Required:	7 credits
Guided Learning Hours (GLH):	35 hours
OCN NI Level 5 Certificate in Green Technologies	
Total Qualification Time (TQT):	150 hours
Total Credits Required:	15 credits
Guided Learning Hours (GLH):	75 hours
OCN NI Level 5 Extended Certificate in Green Technologies	
Total Qualification Time (TQT):	350 hours
Total Credits Required:	35 credits
Guided Learning Hours (GLH):	175 hours

7.4 How to Achieve the Qualifications

To achieve the **OCN NI Level 5 Award in Green Technologies** learners must complete a minimum of 7 credits from any of the optional units.

To achieve the **OCN NI Level 5 Certificate in Green Technologies** learners must complete a minimum of 15 credits from any of the optional units.

To achieve the **OCN NI Level 5 Extended Certificate in Green Technologies** learners must complete a minimum of 35 credits from any of the optional units.

8. Assessment Structure

These qualifications are assessed through internal assessment and each unit is accompanied by specific assessment criteria that define the requirements for achievement.

8.1 Assessment Guidance: Portfolio

The portfolio for these qualifications is designed to provide a comprehensive view of a learner's skills and knowledge. It is a holistic collection of evidence that may include a single piece of evidence that satisfies multiple assessment criteria. There is no requirement for learners to maintain separate evidence for each assessment criterion.

When learners are creating their portfolio, they should refer to the assessment criteria to understand the evidence required.

It is essential that the evidence in the portfolio reflects the application of skills in real-world situations. Learners should ensure that they provide multiple examples or references whenever the assessment criteria require it.

8.2 Understanding the Units

The units outlined in this specification establish clear assessment expectations. They serve as a valuable guide for conducting assessments and ensuring quality assurance efficiently. Each unit within this specification follows a consistent structure. This section explains the operational framework of these units. It is imperative that all educators, assessors, Internal Quality Assurers, and other personnel overseeing the qualification review and familiarise themselves with this section to ensure a comprehensive understanding of how these units function.

- **Title:** The title will reflect the content of the unit and should be clear and concise.
- **Level:** A unit can have one of six RQF levels: Entry, One, Two, Three, Four or Five. All units within these qualifications are Level 5.
- **Credit Value:** This describes the number of credits ascribed to a unit. It identifies the number of credits a learner is awarded upon successful achievement of the unit. One credit is awarded for the learning outcomes which a learner, on average, might reasonably be expected to achieve in a notional 10 hours of learning.
- **Learning Outcome:** A coherent set of measurable achievements.
- **Assessment Criteria:** These enable a judgement to be made about whether or not, and how well, the students have achieved the learning outcomes.
- **Assessment Guidance and Methods:** These detail the different assessment methods within the unit that may be used.
- **Unit Content:** This provides indicative content to assist in teaching and learning.
- **Scope:** This provides possible teaching content.

9. Qualification Summary by Unit

OCN NI Level 5 Award in Green Technologies

Total Qualification Time (TQT) for this qualification: 70 hours
Guided Learning Hours (GLH) for this qualification: 35 hours

In order to achieve the OCN NI Level 5 Award in Green Technologies the learner must successfully complete a minimum of 7 credits from any of the optional units.

OCN NI Level 5 Certificate in Green Technologies

Total Qualification Time (TQT) for this qualification: 150 hours
Guided Learning Hours (GLH) for this qualification: 75 hours

In order to achieve the OCN NI Level 5 Certificate in Green Technologies , the learner must successfully complete a minimum of 15 credits from any of the optional units.

OCN NI Level 5 Extended Certificate in Green Technologies

Total Qualification Time (TQT) for this qualification: 350 hours
Guided Learning Hours (GLH) for this qualification: 175 hours

In order to achieve the OCN NI Level 5 Extended Certificate in Green Technologies , the learner must successfully complete a minimum of 35 credits from any of the optional units.

Unit Reference Number	OCN NI Unit Code	Unit Title	Credit Value	GLH	Level
		Optional Units			
Y/650/1554	CBF753	Solar Photovoltaic Systems	9	49	Five
A/650/1555	CBF754	Anaerobic Digestion	10	52	Five
D/650/1556	CBF755	Solar Thermal Decarbonisation of Hot Water Systems	8	40	Five
F/650/1557	CBF756	Electrical Vehicle Charging Systems	10	48	Five
H/650/1558	CBF757	Ground and Air Source Heat Pumps	10	59	Five
J/650/1559	CBF758	Hydrogen Production Systems and Technologies	10	52	Five
M/650/1560	CBF759	Sustainable Alternative Biofuels	7	35	Five
R/650/1561	CBF760	Electrical Energy Storage Systems	9	47	Five

Unit Reference Number	OCN NI Unit Code	Unit Title	Credit Value	GLH	Level
T/650/7648	CBG281	Small-Scale Domestic Off-Grid Electrical Power Generation	7	35	Five
Y/650/7649	CBG282	Wind Power Generation of Electrical Energy	7	35	Five

10. Unit Content

10.1 Solar Photovoltaic Systems

Title	Solar Photovoltaic Systems
Level	Five
Credit Value	9
Guided Learning Hours (GLH)	49
OCN NI Unit Code	CBF753
Unit Reference No	Y/650/1554
***Unit purpose and aim(s)*:** This unit will enable the learner to understand the processes involved in installing, commissioning and maintaining small scale photovoltaic (PV) systems. The learner will also be able to develop maintenance programmes for and fault find on PV systems.	
Learning Outcomes	**Assessment Criteria**
1. Understand photovoltaic energy generation.	1.1. Evaluate photovoltaic energy generation as an alternative supplementary domestic energy source. 1.2. Evaluate the strengths and weaknesses of photovoltaic energy generation as a green technology, in relation to the current UK energy legislation and strategy. 1.3. Analyse the perspective of utility providers regarding the continual adaptation and extension of the current electrical grid and network a) in relation to the current electrical grid infrastructure and age b) energy produced from alternative power generation 1.4. Calculate the energy requirements of a given number of domestic dwellings and corresponding energy offset due to implementation of a given percentage of photovoltaic systems across these dwellings.
2. Be able to carry out risks assessment on activities and environment associated with installing solar photovoltaic systems.	2.1. Analyse the health and safety issues associated with installing solar photovoltaic systems impacting on all individuals affected by the installation process. 2.2. Carry out risk assessments on activities and environment associated with installing solar photovoltaic systems.
3. Be able to design modular photovoltaic systems.	3.1. Explain the design principles used to determine solar photovoltaic system module array size and position requirements. 3.2. Design a modular PV system to reduce the electrical consumption of a given UK semi-detached dwelling by 25%.
4. Understand solar photovoltaic system protection techniques and components.	4.1. Explain solar photovoltaic system protection techniques and components including: a) anti-islanding protection b) purpose of the inverter

5. Understand the installation, commissioning, and operation of the small-scale photovoltaic system.	5.1. Explain the process of installation, commissioning, and operation of a given small-scale photovoltaic system including: a) system schematics b) component identification c) testing energy performance parameters
6. Be able to design a maintenance programme for a photovoltaic system and fault find to component level.	6.1. Design an annual photovoltaic maintenance regime to ensure optimal system performance of both the solar arrays and electrical components. 6.2. Use meggar test equipment to test electrical breaker switches for AC and DC electrical systems. 6.3. Explain how to identify the correct operation of the Inverter within the photovoltaic system. 6.4. Diagnose faults with an inverter in relation to: a) battery performance and operation b) electrical polarity c) electrical short circuits

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.2 Anaerobic Digestion

Title	Anaerobic Digestion
Level	Five
Credit Value	10
Guided Learning Hours (GLH)	52
OCN NI Unit Code	CBF754
Unit Reference No	A/650/1555
Unit purpose and aim(s): This unit will enable the learner to understand how to address the challenges of waste management, the detrimental effects of waste landfill from methane and utilising a range of alternative sustainable energy. The learner will evaluate the requirements to produce sustainable Anaerobic Digestion (AD) energy, assist local and national government meet landfill site waste reduction and the best uses of AD.	

Learning Outcomes	Assessment Criteria
1. Understand the principles of energy extraction from consumer waste.	1.1. Explain how energy is extracted from consumer waste products. 1.2. Research and calculate reduction in landfill for a given geographical area due to energy extraction from consumer waste products.
2. Understand the principles of using AD as an energy source.	2.1. Analyse the reasons why AD is viewed as a renewable fuel. 2.2. Research and determine the carbon dioxide release as products of combustion from AD consumption against methane release from given landfill waste sites. 2.3. Evaluate the strengths and weaknesses of AD as a renewable source of fuel and waste reduction in relation to the following: a) current energy legislation b) domestic dwelling energy requirements c) calorific values produced d) landfill cost per domestic dwelling 2.4. Analyse the best usage of AD as a fuel and energy source.
3. Be able to determine the AD energy and infrastructure requirements of a town.	3.1. Determine the energy requirements for a given medium sized town and if a given source of AD energy can meet this. 3.2. Determine the infrastructure requirements to supply AD energy to the town identified in AC 3.1.
4. Understand health and safety requirements and standards associated with waste management, and associated risk assessments and safety control development.	4.1. Analyse the health and safety requirements of working in volatile environments in accordance with both EH40 (Environmental Hygiene) and WELs (Workplace Explosive Limits) for all parties impacted by the waste management and gas production. 4.2. Explain the Control of Major Accidents and Hazards Regulations (COMAH) and how they would be implemented in an AD plant.
5. Be able to carry out risk assessments and develop safety controls to support a safe working environment.	5.1. Carry out risk assessments and develop safety controls to support a safe working environment.
6. Understand the six gas states of AD production and associated systems.	6.1. Explain the six gas states of AD production, gas pressures produced, gas controls and equipment used to manage each phase safely.

	6.2. Critically compare and contrast gas states produced by AD against fossil fuel gas.
7. Understand an AD site layout and operation.	7.1. Explain layout of an AD processing plant and operation of main components including: a) waste collection b) hydrolysis c) biogas membrane buffer d) digestor e) bio methane buffer f) compressor
8. Be able to safely carry out maintenance on AD plant components.	8.1. Summarise the skills and qualifications required to safely carry out routine maintenance within AD plants. 8.2. Determine the gases an operative will encounter in the main components of an AD plant and the corresponding Personal Protection Equipment (PPE) required by operatives to work on each component. 8.3. Operate and test given gas control regulators. 8.4. Record the test results from gas control regulators identified in AC 8.3 in relation to: a) nominal operating pressure b) under pressure shut off c) over pressure shut off d) limited relief pressure 8.5. Modify pressure performance of different low pressure gas regulators to an appropriate level through use of diaphragm, orifice and spring replacements.

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Please be advised that learners undertaking the practical elements of this unit must do so in a controlled environment under supervision. Prior to any practical activity being undertaken learners must have demonstrated an understanding of the health and safety requirements before undertaking practical demonstrations.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log

Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.3 Solar Thermal Decarbonisation of Hot Water Systems

Title	Solar Thermal Decarbonisation of Hot Water Systems
Level	Five
Credit Value	8
Guided Learning Hours (GLH)	40
OCN NI Unit Code	CBF755
Unit Reference No	D/650/1556
***Unit purpose and aim(s)*:** This unit will enable the learner to understand how to utilise solar gains to decarbonize hot water systems through designing and installing different alternative sustainable energy systems.	

Learning Outcomes	Assessment Criteria
1. Understand the health and safety requirements and regulations and safe systems of work associated with solar thermal system installation.	1.1. Analyse the health and safety requirements, regulations and safe ways of working of solar thermal system installation in relation to the following: a) construction design and management regulations (CDM) b) working at heights regulations c) manual handling regulations d) Control of Substances Hazardous to Health (COSHH) 1.2. Explain the issues to be addressed in developing a risk management strategy in regard to solar thermal system installation. 1.3. Summarise the legislative and statutory regulations for individuals carrying out the installation, commissioning, operation and maintenance of solar thermal systems.
2. Understand the physics underpinning solar thermal systems.	2.1. Explain the physical principles underpinning solar thermal systems including: a) installation b) collection of energy c) thermo dynamics 2.2. Research what is meant by the following stages of solar energy a) solar Constant b) direct Irradiance c) reflected Irradiance d) diffusion e) diffuse Irradiance 2.3. Explain the four main energy transfer stages of solar power through reflectance, absorbance, emittance, and aperture of solar collectors. 2.4. Calculate the expansion and thermo dynamics of a given solar thermal system using the formula V = (e X c) / 1 (pi / pr) and determine the fluid and glycol percentage mixture required.
3. Understand the design principles underpinning solar thermal systems.	3.1. Explain the design principles underpinning different solar thermal systems and compare the following: a) flat plate collectors b) evacuated tube collectors c) direct evacuated tubes d) heat pipe evacuated tubes

	e) unglazed collectors 3.2. Critically compare and contrast advantages and disadvantages of the following mounting techniques: a) on-roof mount b) in-roof mount c) free standing 3.3. Determine the optimum geographical setting for location and installation of solar thermal collectors within the UK giving reason for choice. 3.4. Determine the daily average solar radiation per month for a given region.
4. Understand function and operation of solar hot water system controls.	4.1. Explain the reason for, function and operation of the following solar hot water system controls: a) fluid expansion b) frost protection c) bacterial growth d) high temperature and steam
5. Be able to design a solar thermal system.	5.1. Design a given small scale solar thermal system in accordance with BS8558 to supply a domestic dwelling including calculation of fossil fuel energy reduction.
6. Understand how to install, commission, and operate a small-scale solar thermal system.	6.1. Explain the health and safety requirements prior to solar thermal system installation. 6.2. Carry out a site external survey (SES) to confirm the following: a) collector orientation b) potential shading c) roof access d) collector size 6.3. Carry out a site internal survey (SIS) to confirm the following: a) hot water consumption and anticipated usage is compliant with regulations b) cold water supplies c) legionella risk controls are in place d) adequate electrical supplies e) position of solar controller and pumps 6.4. Develop a risk management strategy for the solar thermal system installation based on the SES and SIS carried out in ACs 6.2 and 6.3. 6.5. Carry out the installation, commissioning, and operation of a small-scale solar thermal system to manufacturer's instructions including complete carrying out all required checks.
7. Be able to carry out maintenance on solar thermal system components and devices.	7.1. Carry out corrective maintenance of solar thermal systems including: a) diagnosis of irregular operation of differential temperature controller b) diagnosis of the three-control sensor safety triangle

Assessment Guidance
The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered. **Please be advised that learners undertaking the practical elements of this unit must do so in a controlled environment under supervision. Prior to any practical activity being undertaken learners must have demonstrated an understanding of the health and safety requirements before undertaking practical demonstrations.**

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.4 Electrical Vehicle Charging Systems

Title	Electrical Vehicle Charging Systems
Level	Five
Credit Value	10
Guided Learning Hours (GLH)	48
OCN NI Unit Code	CBF756
Unit Reference No	F/650/1557
***Unit purpose and aim(s)*:** This unit will enable the learner to understand the installation of dedicated conductive charging equipment for the charging of pure electric, plug-in hybrid electric road vehicles (PHEV) and extended range of electric vehicles (E-REV).	
Learning Outcomes	**Assessment Criteria**
1. Understand the key health and safety requirements for installing and working with electric vehicle charging equipment (EVCE).	1.1. Explain the Electrical Regulations at Work Act 1989 in relation to installing EVCE systems. 1.2. Explain what is meant by the electrical safety pyramid. 1.3. Explain qualification and competence in electromechanical works in accordance with BS7671 and how this relates to installing and working on EVCE systems. 1.4. Summarise the legislative and statutory regulations for individuals carrying out the installation, inspection, testing and final commissioning handover of an EVCE system.
1. Understand electric vehicle charging EVC, associated charging modes and Wireless Power Transfer (WPT).	2.1. Critically compare the energy transfer of the four modes of EVC charging. 2.2. Explain what is meant by WPT technology and its operation and application including and inductive and microwave systems.
2. Be able to design a domestic EVCE system including electrical supply, protection and earthing.	3.1. Explain the source of electrical supply to the EVCE from a consumer unit in a dwelling including circuit and metering requirements. 3.2. Compare the over current protection requirements for a consumer unit to the following standards: a) BSEN60289 b) BSEN60898 c) BSEN61009-1 d) BSEN60947-6-2 3.3. Explain the key features and issues to be considered when designing a domestic EVCE system including protection and earthing systems. 3.4. Develop a design for and corresponding schematic drawing of a domestic EVCE system to include the following features: a) 32A Supply b) Single Phase c) Terre-Terre (TT) Earthing arrangement d) Mode 3 Energy Transfer/Charging Unit e) Type 3 Connection
3. Be able to install an EVCE system in a domestic dwelling.	4.1. Explain the procedures to be followed when installing a domestic EVCE system from the customers consumer unit including: a) potential health and safety issues including Electricity at Work Act

	b) installation standard BS7671 c) cables, switches and EV charging equipment to be used d) site preparation e) installation stages 4.2. Carry out the safe installation of an EVCE system in a domestic dwelling in line with design developed in AC 3.4.
4. Be able to carry out safe isolation of an EVCE installation.	5.1. Select, explain and demonstrate the use of appropriate measuring instruments to safely isolate the EVCE system installed in AC 4.2. including testing: a) continuity of protective conductors b) insulation resistance test c) separated extra-low voltage (SELV) and protective extra-low voltage (PELV) extra low voltage testing d) electrical separation e) polarity
5. Be able to complete the inspection, testing and final commissioning handover of an EVCE system.	6.1. Select, explain and demonstrate the use of appropriate measuring instruments to carry out the process of initial verification of the EVCE system installed in AC 4.2. including testing: a) earth electrode resistance b) earth fault loop impedance c) operation of Residual Current Devices (RCDs) d) phase rotation sequence e) voltage drops 6.2. Carry out inspection, testing, final commissioning certificate to BS7671 and handover of the EVCE system installed in AC 4.2 in line with requirements and processes undertaken in AC 6.1.

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Please be advised that learners undertaking the practical elements of this unit must do so in a controlled environment under supervision. Prior to any practical activity being undertaken learners must have demonstrated an understanding of the health and safety requirements before undertaking practical demonstrations.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log

Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.5 Ground and Air Source Heat Pumps

Title	Ground and Air Source Heat Pumps
Level	Five
Credit Value	10
Guided Learning Hours (GLH)	59
OCN NI Unit Code	CBF757
Unit Reference No	H/650/1558
***Unit purpose and aim(s)*:** This unit will enable the learner to understand the operation, design, and specification of ground and air source heat pumps.	
Learning Outcomes	**Assessment Criteria**
1. Understand the health and safety requirements and standards associated with heat pump installation.	1.1. Analyse the health and safety requirements of the heat pump system installation in relation to the following: a) construction design and management regulations (CDM) b) Electricity at Work Act (EAW) c) Health and Safety at Work Act 1974 HASAWA 1974 d) manual handling regulations e) Control of Substances Hazardous to Health (COSHH) f) Fluorinated gases regulations (FGAS)
2. Understand how to develop a risk management strategy for a ground source closed loop collector system.	2.1. Develop a risk management strategy to be implemented for a ground source closed loop collector system.
3. Understand the operating principles of different heat pump types.	3.1. Critically compare and contrast energy collection and transfer between the air and ground source heat pumps. 3.2. Critically compare and contrast monovalent and bivalent heat pump systems. 3.3. Select with justification the appropriate monovalent or bivalent heat pump systems for different dwellings.
4. Understand vapour compression and absorption cycles and the function of vapour compression cycle components.	4.1. Critically compare the vapour compression and absorption cycles. 4.2. Explain the functions of each of the following vapour compression cycle components: a) heat exchanger b) expansion valve c) compressor d) condenser e) dryer
5. Be able to research and design heating system elements.	5.1. Research relevant data and information to inform the design of the following: a) an internal pipeline heating system to given specifications for connection to a heat pump b) a heat emitter system with given optimal temperature difference powered by a given heat pump c) heat emitters for a given heat pump system
6. Be able to calculate the thermal expansion and thermo dynamics of an air source heat pump system.	6.1. Calculate the thermal expansion and thermo dynamics of a given air source heat pump system for a specified optimal operating temperature.

Assessment Guidance		
The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.		
Assessment Method	**Definition**	**Possible Content**
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.6 Hydrogen Production Systems and Technologies

Title	Hydrogen Production Systems and Technologies
Level	Five
Credit Value	10
Guided Learning Hours (GLH)	52
OCN NI Unit Code	CBF758
Unit Reference No	J/650/1559
Unit purpose and aim(s): This unit will enable the learner to understand the safe use of hydrogen, hydrogen production systems and technologies.	

Learning Outcomes	Assessment Criteria
1. Understand the health and safety requirements and standards for hydrogen production systems and technologies.	1.1. Analyse the health and safety requirements of working on premix gas production in volatile environments in accordance with Environmental Hygiene (EH40) and Workplace Explosive Limits (WELs). 1.2. Explain the characteristics of molecular hydrogen (H2) in relation to lower explosive limit (LEL) and upper explosive limits (UEL) and required safety regimes when using H2 as an energy source. 1.3. Summarise the legislative and statutory regulations for individuals carrying out the blending of hydrogen and natural gas and setting, measuring and stabilisation of hydrogen mixes at different pressures.
2. Understand how to carry out risk assessments and develop safety controls when working in gaseous atmospheres.	2.1. Explain how to carry out risk assessments and develop safety controls to support safe working environments in gaseous atmospheres.
3. Be aware of trends, legislative frameworks, environmental impact and fuel security in relation to energy usage.	3.1. Research and present current UK fuel energy usage trends and associated carbon dioxide (CO2) emissions. 3.2. Evaluate the emissions identified in AC 3.1 against H2 CO2 emissions. 3.3. Research and analyse the legislative pathway from current fossil fuel usage to Zero Carbon 2050. 3.4. Critically compare fuel security and environmental impact of the usage of conventional oil and gas in a given region against localised hydrogen production.
4. Understand hydrogen production processes.	4.1. Explain the six hydrogen production processes. 4.2. Critically compare green electrolysis H2 against the other five forms of H2 production.
5. Understand the impact of hydrogen on the gas grid network system.	5.1. Research and explain the effects of Hydrogen Embrittlement (HE), Stress Corrosion Cracking (SCC), and Creep, caused by H2 on the upstream and downstream gas infrastructure.
6. Be able to carry out gas blending for hydrogen and natural gas.	6.1. Explain the process of blending hydrogen and natural gas. 6.2. Carry out gas blending for hydrogen and natural gas to correct ratio for given hybrid appliances using appropriate equipment.

7. Be able to carry out the setting, measuring and stabilisation of hydrogen mixes at different pressures.	7.1. Research fuel gas mixtures and the dynamics of mixing different combustible gases. 7.2. Carry out the setting, measuring and stabilisation of hydrogen mixes at different pressures including: a) high b) two-stage c) low
8. Understand the by-products from combustion of H2 and fossil fuels and implications for system design.	8.1. Compare and contrast the production of nitrogen oxides (NOX) and condensate from combustion of H2 to that from current fossil fuels including implications for system design.

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Please be advised that learners undertaking the practical elements of this unit must do so in a controlled environment under supervision. Prior to any practical activity being undertaken learners must have demonstrated an understanding of the health and safety requirements before undertaking practical demonstrations.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.7 Sustainable Alternative Biofuels

Title	Sustainable Alternative Biofuels
Level	Five
Credit Value	7
Guided Learning Hours (GLH)	35
OCN NI Unit Code	CBF759
Unit Reference No	M/650/1560
Unit purpose and aim(s): This unit will enable the learner to understand the use of sustainable alternative biofuels and their impact.	
Learning Outcomes	**Assessment Criteria**
1. Understand the health and safety requirements and standards associated with liquid biofuel storage.	1.1. Analyse the health and safety requirements and standards associated with liquid biofuel storage including: a) Environmental Hygiene (EH40) b) Fuel Storage Regulations 2010 c) Building Regulations Part L 1.2 Summarise the legislative and statutory regulations for individuals carrying out installation and commissioning of a hydrotreated vegetable oils (HVO) firing appliance.
2. Be able to develop risk assessments and safety controls to support the safe working environment for a liquid biofuel storage facility.	2.1. Develop risk assessments and safety controls to support the safe working environment for a given liquid biofuel storage facility.
3. Understand biofuel production.	3.1. Explain how biofuel and associated energy is extracted from different organic materials. 3.2. Analyse reasons why biofuel is a renewable energy source. 3.3. Critically compare products from the combustion of HVOs and kerosene.
4. Understand how biofuels can impact on the green economy, fuel security and agricultural industry.	4.1. Analyse how manufacturing biofuels can impact on the following in a given region: a) the green economy b) the agricultural industry c) fuel security
5. Understand conversion of appliances to using biofuel.	5.1. Analyse the technical advances within oil burning appliances to facilitate conversion to using biofuels.
6. Be able to install and commission an HVO firing appliance.	6.1. Demonstrate the correct installation and commissioning of a HVO firing appliance including: a) initial system compliance checks against manufacturer's instructions b) pressure testing the HVO fuel line to current standards c) purging the HVO to the appliance d) commencing combustion process e) carrying out a smoke test f) completing an Electronic Flue Gas Analysis (EFGA) g) recording all findings in an industry standard format

Assessment Guidance
The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered. **Please be advised that learners undertaking the practical elements of this unit must do so in a controlled environment under supervision. Prior to any practical activity being undertaken learners must have demonstrated an understanding of the health and safety requirements before undertaking practical demonstrations.**

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.8 Electrical Energy Storage Systems

Title	Electrical Energy Storage Systems
Level	Five
Credit Value	9
Guided Learning Hours (GLH)	47
OCN NI Unit Code	CBF760
Unit Reference No	R/650/1561
***Unit purpose and aim(s)*:** This unit will enable the learner to understand how to install, test and commission electrical energy storage systems (EESS).	
Learning Outcomes	**Assessment Criteria**
1. Understand the key health and safety requirements for installing and working with EESS.	1.1. Summarise the legislative and statutory regulations for individuals carrying out the installation, inspection, testing, final commissioning handover and operation of an EESS system. 1.2. Explain the Electrical Regulations at Work Act 1989 in relation to installing EESS. 1.3. Explain what is meant by the electrical safety pyramid. 1.4. Explain qualification and competence in electromechanical works in accordance with BS7671 and G98/1 and how these relate to installing and working on EESS systems.
2. Understand EESS subsystem operation.	2.1. Explain the operation of the following subsystem components and processes: a) direct monitoring of AC current b) direct monitoring of DC current c) monitoring of DC current and voltage state 2.2. Explain the following battery check procedures for an EESS system: a) assessing operation of the charger b) assessing battery health status 2.3. Explain what is a subsystem communication system. 2.4. Explain the operation of the set point controller for the inverter charger and Maximum Power Point Tracking (MPPT). 2.5. Explain the use of a photovoltaic (PV) generation export meter. 2.6. Summarise the ventilation requirements for an EESS system.
3. Be able to design a domestic EESS system including electrical supply, protection and earthing.	3.1. Explain the source of electrical supply to the EESS from a consumer unit in a dwelling including circuit and metering requirements. 3.2. Compare the over current protection requirements for a consumer unit to the following standards: a) BSEN60289 b) BSEN60898 c) BSEN61009-1 d) BSEN609047-6-2 3.3. Explain the key features and issues to be considered when designing a domestic EESS system including protection and earthing systems.

	3.4. Develop a design for and corresponding schematic drawing of a domestic EESS system to include the following features: a) 32A Supply b) Single Phase c) Terre-Terre (TT) Earthing arrangement d) Mode 3 Energy Transfer/Charging Unit e) Type 3 Connection
4. Be able to install an EESS system in a domestic dwelling.	4.1. Explain the procedures to be followed when installing a domestic EESS system from the customers consumer unit including: a) potential health and safety issues including Electricity at Work Act b) installation standard BS7671 c) cables, switches and EV charging equipment to be used d) site preparation e) installation stages 4.2. Carry out the safe installation of an EESS system in a domestic dwelling in line with design developed in AC 3.4.
5. Be able to carry out safe isolation of an EESS installation.	5.1. Select, explain and demonstrate the use of appropriate measuring instruments to safely isolate the EESS system installed in AC 4.2. including testing: a) continuity of protective conductors b) insulation resistance test c) separated extra-low voltage (SELV) and protective extra-low voltage (PELV) extra low voltage testing d) electrical separation e) polarity
6. Be able to complete the inspection, testing and final commissioning handover of an EESS system.	6.1. Select, explain and demonstrate the use of appropriate measuring instruments to carry out the process of initial verification of the EESS system installed in AC 4.2. including testing: a) earth electrode resistance b) earth fault loop impedance c) operation of Residual Current Devices (RCDs) d) phase rotation sequence e) voltage drops 6.2. Carry out inspection, testing, final commissioning certificate to BS7671 and handover of the EESS system installed in AC 4.2 in line with requirements and processes undertaken in AC 6.1.

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Please be advised that learners undertaking the practical elements of this unit must do so in a controlled environment under supervision. Prior to any practical activity being undertaken learners must have demonstrated an understanding of the health and safety requirements before undertaking practical demonstrations.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken	Learner notes/written work Learner log/diary

	to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.9 Small-Scale Domestic Off-Grid Electrical Power Generation

Title	Small-Scale Domestic Off-Grid Electrical Power Generation
Level	Five
Credit Value	7
Guided Learning Hours (GLH)	35
OCN NI Unit Code	CBG281
Unit Reference No	T/650/7648
Learn Direct Code	TD3
Unit purpose and aim(s): This unit will enable the learner to understand the processes involved in installing, commissioning, and maintaining small-scale domestic off-grid electrical systems. The learner will also be able to develop maintenance programmes for and fault find on the off-grid power system.	

Learning Outcomes	Assessment Criteria
1. Understand off-grid energy generation and associated electrical power infrastructure.	1.1. Evaluate small-scale off-grid energy generation as an alternative supplementary domestic energy source. 1.2. Evaluate the strengths and weaknesses of stand-alone energy generation as a green technology in relation to the current UK energy legislation and strategy. 1.3. Analyse the perspectives of electrical utility providers and off-grid consumers regarding the continual adaptation and extension of the current electrical grid and network including: a) current electrical grid infrastructure and age b) energy produced from alternative power generation
2. Be able to calculate the energy off-set of domestic dwellings.	2.1. Calculate the energy off-set of a given domestic UK dwelling.
3. Be able to carry out risk assessments on activities and environment associated with installing small-scale domestic off-grid power generation systems.	3.1. Analyse the health and safety issues associated with the installation of small-scale domestic off-grid systems. 3.2. Carry out risk assessments on activities and environment associated with installing small-scale domestic off-grid power generation systems.
4. Be able to design a small-scale domestic off-grid power generation system.	4.1. Explain the design principles used to determine the size and output of the off-grid system including: a) preferred energy generation type b) potential electrical energy consumption c) energy off-set requirements 4.2. Design a modular small-scale domestic off-grid power generation system.
5. Understand the electrical protection systems required for small-scale domestic off-grid electrical systems.	5.1. Explain with justification the reasons for using and operation of a high voltage protection device including the four levels of protection it provides to the electrical system.

6. Understand the installation, commissioning, and operation of small-scale domestic off-grid power generation systems.	6.1. Explain the process of installation, commissioning, and operation of a given small-scale domestic off-grid power generation system including: a) system schematics b) component identification c) testing of energy performance parameters
7. Be able to design a maintenance programme for a small-scale domestic off-grid power generation system and fault find to component level.	7.1. Design an annual off-grid maintenance regime to ensure optimal system performance of a small-scale domestic off-grid power generation system. 7.2. Explain how to determine if the inverter in a photovoltaic system linked to an off-grid system is operating correctly. 7.3. Diagnose faults in an off-grid inverter system including : a) battery performance and operation b) electrical polarity c) electrical short circuits

Additional assessment guidance: For assessment criteria 2.1 the dwelling should be one where the average is 2,900Kw/hr and off grid energy generated is generated from a 4.4Kw unit. For assessment criteria 4.2 the design should be in relation to UK semi-detached dwelling to reduce energy consumption by 30%. For assessment criteria 7.1 the maintenance regime should refer to the solar arrays, generator, inverter and associated electrical components.

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

10.10 Wind Power Generation of Electrical Energy

Title	Wind Power Generation of Electrical Energy
Level	Five
Credit Value	7
Guided Learning Hours (GLH)	35
OCN NI Unit Code	CBG282
Unit Reference No	Y/650/7649
Learn Direct Code	TD3
Unit purpose and aim(s): This unit will enable the learner to understand the processes involved in installing, commissioning, and maintaining small scale wind powered electrical energy generation systems. The learner will also be able to develop maintenance programmes for and understand how to fault find on wind power systems.	

Learning Outcomes	Assessment Criteria
1. Understand factors to be considered when planning the installation of a wind turbine.	1.1. Explain the wind speed and area required for installation of a small-scale wind turbine. 1.2. Explain the factors to be considered when determining the optimum installation location for a wind turbine including: a) energy performance b) noise pollution c) aesthetics d) electrical grid infrastructure, positioning and age
2. Be able to carry out risk assessments on activities and environment associated with the installation of small-scale wind powered electrical generation systems.	2.1. Analyse the health and safety issues associated with the installation of small-scale wind powered electrical generation systems. 2.2. Carry out risk assessments on activities and environment associated with installing small-scale wind powered electrical generation systems.
3. Be able to carry out a cost benefit analysis on the installation of small-scale wind powered electrical generation systems.	3.1. Calculate the seasonal wind power generation for a given small-scale wind turbine in the UK or Ireland. 3.2. Carry out a cost benefit analysis on the installation of a given small-scale wind powered electrical generation system including: a) initial installation costs b) potential electrical energy savings against consumption c) off-set requirements
4. Be able to determine energy usage and carbon off-sets.	4.1. Explain the key aspects of using fossil fuels to produce electrical energy. 4.2. Determine the average electrical Kw/Hrs consumed, in a given UK domestic dwelling, percentage of CO2 produced per dwelling against UK Government CO2 reduction strategies. 4.3. Determine the carbon offset from using wind power electrical production for a given dwelling.
5. Understand site selection, preparation and operation of small-scale wind powered electrical generation systems.	5.1. Explain the factors to be considered during site selection and preparation of small-scale wind powered electrical generation systems.

	5.2. Explain the operation of small-scale wind powered electrical generation systems including: a) system schematics; turbine to grid b) nacelle c) hub d) blades
6. Be able to design a maintenance programme for a small-scale wind powered generation system.	6.1. Design a maintenance programme for a small-scale wind powered generation system to maintain optimal performance.
7. Understand how to fault find on a small-scale wind powered generation system.	7.1. Explain how to fault find on a small-scale wind powered generation system to maintain optimal performance including the following: a) yaw b) gearbox c) controller d) main shaft bearing

Assessment Guidance

The following assessment method/s may be used to ensure all learning outcomes and assessment criteria are fully covered.

Assessment Method	Definition	Possible Content
Portfolio of evidence	A collection of documents containing work undertaken to be assessed as evidence to meet required skills outcomes OR A collection of documents containing work that shows the learner's progression through the course	Learner notes/written work Learner log/diary Peer notes Record of observation Record of discussion
Practical demonstration/assignment	A practical demonstration of a skill/situation selected by the tutor or by learners, to enable learners to practise and apply skills and knowledge	Record of observation Learner notes/written work Learner log
Coursework	Research or projects that count towards a learner's final outcome and demonstrate the skills and/or knowledge gained throughout the course	Record of observation Learner notes/written work Tutor notes/record Learner log/diary
E-assessment	The use of information technology to assess learners' work	Electronic portfolio E-tests

11. Quality Assurance of Centre Performance

11.1 Internal Assessment

When delivering and assessing these qualifications, centres must align with stakeholders' expectations and address learners' needs by implementing a practical and applied programme. Centres have the flexibility to customise programmes to meet local requirements and establish connections with local employers and the broader vocational sector.

The Assessor should work with the Internal Quality Assurer to ensure that the assessment is planned in line with OCN NI requirements. Assessment Plans must be developed and approved by the Internal Quality Assurer prior to the delivery of the qualification.

All units within these qualifications must undergo internal assessment. Learners must provide evidence that they have appropriately met all assessment criteria required for that grade.

The assessment format for all units involves a task conducted after the delivery of the unit's content, or part of it, if multiple tasks are used. Tasks may exhibit in various forms, encompassing practical and written types. Please refer to 'OCN NI's Assessment Definitions Guide' for additional details.

A task constitutes a distinct activity completed independently by learners, separated from teaching, practice, exploration, and other activities guided by tutors. Tasks are assigned to learners with a specified start date, completion date, and explicit requirements for the evidence to be produced. Some tasks may include observed practical components and require diverse forms of evidence.

A valid assignment will enable a clear and formal assessment outcome, which meets the requirements of the assessment criteria. Assessment decisions are based on the specific assessment criteria given in each unit and set at each grade level. The way in which individual units are written provides a balance of assessment of understanding, practical skills and vocational attributes appropriate to the purpose of qualifications.

It is the Assessor's role to ensure that learners are appropriately prepared for assessment, this begins from induction onwards. Assessors should ensure that learners understand how assessment tasks are used to determine the award of credit, the importance of meeting assessment timelines, and that all learners work must be independently created, where source documents are used this should be appropriately referenced, learners should be aware of what would constitute plagiarism and the possible consequences.

When conducting the assessment, Assessors must ensure they do not provide direct input, instructions or specific feedback which may compromise the authenticity of the work submitted.

Once the Assessor has authenticated the learners work, they must transparently demonstrate the rationale behind their assessment decisions. Once a learner completes all assigned tasks for a unit, the Assessor will allocate a grade for the unit. Refer to the 'Unit Grading Matrix' for additional information on the grading process.

Once the Assessor has completed the assessment process for the task, the assessment decision is recorded formally, and feedback is provided to the learner. The feedback should show the learner the outcome of the assessment decision, how it was determined or where the criteria has been met, it may indicate to the learner why achievement of the assessment criteria has not been met. It must be clear to the learner that this Assessment outcome is subject to verification.

For further information on assessment practice, please see the 'OCN NI Centre Handbook'. Assessment Training is also available and can be booked through the OCN NI Website.

11.2 Internal Quality Assurance

The role of the Internal Quality Assurer is to ensure appropriate internal quality assurance processes are carried out. The Internal Quality Assurer must oversee that assessments are conducted in accordance with relevant OCN NI policies, regulations, and this specification.

The Internal Quality Assurer must ensure assessments are fair, reliable, and uniform, thereby providing a consistent standard for all learners.

Internal Quality Assurers are required to provide constructive feedback to Assessors, identifying areas of strength and those that may require improvement. This feedback contributes to the ongoing professional development of Assessors.

Contributing to the standardisation of assessment practices within the centre is an important function of this role. This entails aligning assessment methods, grading criteria, and decision-making processes to maintain fairness and equity.

Internal Quality Assurers will actively engage in the sampling and monitoring of assessments to ensure the consistency and accuracy of assessment decisions. This process helps identify trends, areas for improvement, and ensures the robustness of the overall assessment system.

For further information on Internal Quality Assurance practice, please see the 'OCN NI Centre Handbook'. Internal Quality Assurance Training is also available and can be booked through the OCN NI Website.

11.3 Documentation

For internal quality assurance processes to be effective, the internal assessment and Internal Quality Assurance team needs to keep effective records.

- The programme must have an assessment and Internal Quality Assurance plan. When producing a plan, they should consider:
    - the time required for training and standardisation activities
    - the time available to undertake teaching and carry out assessment,
    - consider when learners may complete assessments and when quality assurance will take place
    - the completion dates for different assessment tasks
    - the date by which the assignment needs to be internally verified
    - sampling strategies
    - how to manage the assessment and verification of learners' work so that they can be given formal decisions promptly
    - how resubmission opportunities can be scheduled.

The following documents are available from OCN NI and document templates can be found in the Centre Login section of the OCN NI website www.ocnni.org.uk:

- A1 – Learner Assessment Record per Learner
- Learner Authentication Declarations
- Records of any reasonable adjustments applied for and the outcome – please see 'OCN NI's Reasonable Adjustments and Special Consideration Policy' for further information
- M1 Internal Quality Assurance Sample Record
- M2 Feedback to Assessor
- Records of any complaints or appeals

11.4 External Quality Assurance

All OCN NI recognised centres are subject to External Quality Assurance. External quality assurance activities will be conducted to confirm continued compliance with the CCEA Regulation General Conditions of Recognition, OCN NI terms and conditions and the requirements outlined within this qualification specification.

The External Quality Assurer is assigned by OCN NI. The External Quality Assurer will review the delivery and assessment of these qualifications. This will include, but is not limited to, the review of a sample of assessment evidence and evidence of the internal quality assurance of assessment and assessment decisions. This will form the basis of the External Quality Assurance report and will help OCN NI determine the centre's risk.

The role of the External Quality Assurer serves as an external overseer of assessment quality, working to uphold consistency, compliance, and continuous improvement within the assessment process. Their role is crucial in ensuring that assessments are valid, reliable, fair, and aligned with the required standards and regulations.

For further information on OCN NI Centre Assessments Standards Scrutiny (CASS) Strategy, please see the OCN NI Centre Handbook.

11.5 Standardisation

As a process, standardisation is designed to ensure consistency and promote good practice in understanding and the application of standards. Standardisation events:

- make qualified statements about the level of consistency in assessment across centres delivering a qualification
- make statements on the standard of evidence that is required to meet the assessment criteria for units in a qualification
- make recommendations on assessment practice
- produce advice and guidance for the assessment of units
- identify good practice in assessment and Internal Quality Assurance

Centres offering these qualifications must carry out internal standardisation activities prior to the claim for certification.

Centres offering units of an OCN NI qualification must attend and contribute assessment materials and learner evidence for standardisation events if requested.

OCN NI will notify centres of the nature of sample evidence required for standardisation events (this will include assessment materials, learner evidence and relevant Assessor and Internal Quality Assurer documentation). OCN NI will make standardisation summary reports available and correspond directly with centres regarding event outcomes.

12. Administration

12.1 Registration

A centre must register learners for these qualifications within 20 days of commencement of the delivery of the programme.

For further information on learner registration please see the OCN NI Centre Handbook and the QuartzWeb Manual, available through the Centre Login section of the OCN NI website. Administration training is also available and can be booked through www.ocnni.org.uk.

12.2 Certification

Once all internal quality assurance activities have been successfully completed, the centre can claim certification for the learner(s).

Certificates will be issued to centres within 20 working days from completion of a satisfactory external quality assurance activity, if appropriate, alternatively from the submission of an accurate and complete marksheet.

It is the responsibility of the centre to ensure that certificates received from OCN NI are held securely and distributed to learners promptly and securely.

For further information on the uploading of results please see the QuartzWeb Manual for guidance, administration training is also available and can be booked through OCN NI

12.3 Charges

OCN NI publishes all up-to-date qualification fees in its Fees and Invoicing Policy document. Further information can be found on the centre login area of the OCN NI website.

12.4 Equality, Fairness and Inclusion

OCN NI's are committed to ensuring all learners have an equal opportunity to access our qualifications and assessment, and that our qualifications are awarded in a way that is fair to every learner.

OCN NI is committed to making sure that:

- learners with a protected characteristic are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers

For information on reasonable adjustments and special considerations please see the OCN NI Centre Handbook and Reasonable Adjustments and Special Considerations Policy held in the back office of the OCN NI website.

12.5 Retention of Evidence

OCN NI has published guidance for centres on the retention of evidence. Details are provided in the OCN NI Centre Handbook and can be accessed via the OCN NI website.

OCN NI Level 5 Award in Green Technologies
Qualification Number: 610/0594/0

OCN NI Level 5 Certificate in Green Technologies
Qualification Number: 610/0593/9

OCN NI Level 5 Extended Certificate in Green Technologies
Qualification Number: 610/0592/7

Operational start date: 15 March 2022
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