



**CONSTRUCTION BLUEPRINT
SECTORAL STRATEGIC APPROACH
TO COOPERATE ON SKILLS
IN THE CONSTRUCTION INDUSTRY
WP3.**

**Enabling transnational
sector-wide new skills**

**T.2.2. VET curricula on energy
efficiency, circular economy
and digitalisation**



Co-funded by the
Erasmus+ Programme
of the European Union



Co-funded by the
Erasmus+ Programme
of the European Union

ERASMUS+ PROGRAMME

KEY ACTION 2 | CALL 2018

COOPERATION FOR INNOVATION AND THE EXCHANGE OF GOOD PRACTICES SECTOR
SKILLS ALLIANCES FOR IMPLEMENTING A NEW STRATEGIC APPROACH (“BLUEPRINT”) TO
SECTORAL COOPERATION ON SKILLS

PROJECT NUMBER:

600885-EPP-1-2018-1-ES-EPPKA2-SSA-B

PARTNERSHIP		
VET PROVIDERS	SECTORAL REPRESENTATIVES	COUNTRY
FLC (COORDINATOR)	CNC	SPAIN
IFAPME	EMBUILD	BELGIUM
SATAEDU	--	FINLAND
CCCA-BTP	FFB	FRANCE
BZB	ZDB	GERMANY
BFW-NRW		
AKMI	PEDMEDE	GREECE
TUS	--	IRELAND
FORMEDIL	ANCE	ITALY
VSRC	LSA	LITHUANIA
CENFIC	--	PORTUGAL
SCKR	CCIS CCBMIS	SLOVENIA
	BUDOWLANI (TRADE UNION)	POLAND
	FIEC	EU
	EFBWW	EU
	EBC	EU

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

TABLE OF CONTENTS

Introduction	5
Energy Efficiency	8
Circular Economy in the construction industry	28
Digitalisation for construction	45

INTRODUCTION

One of the objectives of the Construction Blueprint project is to promote the upskilling and reskilling of construction workers in the European Union. Among other activities, the consortium has worked on the design and development of a series of training curricula for Vocational Training and Education.

A detailed study developed through the conduction of dedicated surveys on training needs carried out with the VET centres of the countries of the project (Belgium, France, Finland, Italy, Ireland, Germany, Greece, Lithuania, Poland, Portugal, Slovenia, Spain), revealed what professional skills were needed to upgrade the skills of construction workers in the topics of Energy Efficiency, Circular Economy and Digitalisation.

In the category of Energy Efficiency, it was concluded that awareness and skills are needed around the subject of nZEB and Passiv house. VET centres suggested that knowledge is needed around thermal insulation, energy efficient building systems (HVAC), renewable energy, as well as compliance with EU and national policies around energy efficiency of buildings and certification of buildings. Energy efficient retrofitting of buildings and historic buildings was also strongly suggested. It was felt that the training should be adapted according to different trades (bricklayer, roofer, carpenter, plumber, plasterer, electrician).

In the category of Circular Economy, waste management was the most strongly suggested topic. Other suggested topics were around sustainable construction, LCA, green procurement, and business models for circular economy as well as national and EU legislation concerning the circular economy.

In the category of Digitalisation, it was strongly suggested by VET centres that knowledge and awareness around the BIM method is needed. Digital tools used on the construction site, BIM software, BIM for energy efficiency and use of BIM in the overall construction process were all suggested as topics. Although, it was felt by some VET centres that there is little need for high level knowledge around BIM for EQF level 4-only checking the building drawings. Also suggested were topics around digital tools for health and safety, home automation, drones, as well as Augmented Reality and Virtual Reality.

The results of the survey also showed the necessity to develop training programmes with modules of general content, since it became clear that specialised occupational groups of EQF levels 3-6 in the respective subject areas are confronted with a broader content and are a digitally less qualified occupational group of the construction industry.

Another Skills Needs Analysis developed by the partners gives a good indication of current and future training needs. A lack of professionals, consultants and workers in energy efficiency has been identified in most countries as well as a number of skill gaps in each country where trainings are needed. A lack of skills in circular economy is confirmed in the construction sector; it is felt particularly that training on the performance of management of waste should be introduced in the national VET systems as well as specific information on the impact of construction products on the environment. As regards with digitalisation, most experts and countries focused the digital transformation of the construction industry on BIM, however, it is felt that awareness is needed beyond that, covering other digital technologies such as robots, drones, automation, 3D printers and scanners, etc., and how BIM is combined with these other technologies.

Based on these results, VET curricula have been designed and developed including specific training in the fields of Energy Efficiency, Circular Economy in construction and Digitalisation of the sector, and are addressed towards workers and/or students with a qualification level between 3-5 of the European Qualification Framework (EQF).

The VET curricula listed below are common at the European level, however, each country participating in the project has adapted the programmes according to their national needs. In addition, any VET school in these countries or in other EU countries may adapt them to suit the training needs of their students.

The trainings are structured in order to respond to different training needs of the target profiles (general construction worker, bricklayer, carpenter, electrician, plasterer, plumber and site supervisor), and includes programme, objectives, competences covered, number of hours, etc.



This curricular design takes also into account the adaption of the training for a potential adoption in Initial VET and Continuous VET, considering different types of delivery: face-to-face, e-learning, blended learning. Also, it considers aspects of Work Based Learning (WBL). The number of hours include theoretical and practical topics, and can be adjusted to the training in the workplace or physical workshops in the VET centre.

Based on the information gathered from the indicators of training needs outlined in this research report, all the topics included in the three training curricula are completed with concrete training materials, that have been used in pilot courses in all the countries of the consortium.

Thus, generic training material for the Construction Blueprint VET trainings have been developed in the three categories of energy efficiency, digitalisation and circular economy, and approved by partners. VET providers have chosen which categories they would like to pilot, and also in which occupation they would like to pilot the trainings with. This has allowed the trainings to be made specific to each country and occupation.

Once the project will be finalised, the training material will be made available for any VET provider that would like to use them (upon request). This material could also be adjusted to the needs of the users.

For VET providers that would like to use this material, it will be possible to contact with the national referent for the Construction Blueprint project in the country:

Country	Training provider	Contact	Link
Belgium	Centre IFAPME Liège-Huy-Verviers	Caroline Bricteux caroline.bricteux@centreifapme.be	
France	Comité de Concertation et de Coordination de l'Apprentissage du Bâtiment et des Travaux Publics (CCCA-BTP)	Marek Lawinski marek.lawinski@ccca-btp.fr	
Finland	Satakunnan Koulutuskuntayhtymä (Sataedu)	Jari Pentinmäki jari.pentinmaki@sataedu.fi	
Italy	Ente Unico Formazione e Sicurezza	Stefano Macale. Director stefano.macale@formedil.it	
Ireland	Technological University of the Shannon: Midlands Midwest (TUS)	Gloria Callinan Gloria. Callinan@tus.ie	
Germany	Berufsförderungswerk der Bauindustrie NRW gGmbH (BFW-NRW)	Dipl.-Ing. Ulrich Goos U.Goos@bauindustrie-nrw.de	
	Bildungszentren des Baugewerbes e.V. (BZB)	Frank Bertelmann-Angenendt frank.bertelmann@bzb.de	

Country	Training provider	Contact	Link
Greece	Institute of Vocational Training (AKMI)	Theodore Grassos grassos@akmi-international.com	
Lithuania	Viesoji istaiga Vilniaus statybininku rengimo centras (VSRK)	Danielius Burokas danielius@vsrk.lt	
Portugal	Centro de Formação Profissional da Indústria da Construção Civil e Obras Públicas do Sul (Cenfic)	João Luís Cabrita joao.cabrita@cenfic.pt	
Slovenia	Šolski center Kranj (SCKR)	Igor Pinter igor.pinter@sckr.si	
Spain	Fundación Laboral de la Construcción	Beatriz Oliete boliete@fundacionlaboral.org	

ENERGY EFFICIENCY

The VET programme below on Energy Efficiency correspond to the generic profile of construction workers, but the topic of Energy Efficiency shows differences in terms of skills for different profiles, therefore this generic programme has been adapted to the main profiles identified in the Construction Blueprint project as more in need of upskilling/reskilling in Energy Efficiency, Circular Economy and Digitalisation:

- Bricklayer
- Carpenter
- Electrician
- Plasterer
- Plumber
- Site Supervisor

Further information about these adapted curricula can be requested from the national contact referent indicated above.

To be noted that the Curricula on Circular Economy and Digitalisation are common for all the occupational profiles.

NZEB/Energy Efficiency for Construction (EQF level 4) Construction Workers	
TRAINING AIM	
<p>The aim of the programme is to increase the learners' knowledge of principles and practices applied to the construction/retrofitting of low energy/nearly zero energy buildings. This improved knowledge will allow such workers apply their existing skills, so that relevant energy efficient techniques and standards are achieved</p>	
Number of Hours	1-2 hours theory + 1-2 hours practical lessons per week or full time. Total: 60 hours – 21 hrs contact, and 39 hrs self-directed study (Choose relevant modules)
Type of discipline	e-learning tools, facilities for practical demonstration and training, and assessment/examination procedures
EQF level	4
Preliminary requirements	The students are expected to have some basic or no knowledge on building physics & building materials, building construction basics.
Assessment procedure	Continuous Assessment (Individual and group work)
Technical secure (Hardware and software)	White board Multimedia facility Demonstration models Practical training models Samples of components and materials, suitable for deep renovation Demonstration videos
Lectures	Online facility Classroom facility Expert guest speakers
Resources	Moodle platform (or equivalent) Induction pack: structure of programme, registration info, introduction to programme, helpdesk details and forum) Learning resources: reading resources, videos, materials, etc.

MODULES

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
1	INDUCTION		1.00	0.00	1.00
MODULE AIM					
State the planned outcomes and the conditions attached to the attendance on the course; apply good safety, health and hygiene practices; understand the rules of the centre and explain the meaning of equal opportunities.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	State the aim and outline the objectives of the training programme, the certification that is available and get to know fellow learners.				
2	Identify different learning styles and delivery used for the training and outline the structure and indicative programme of the training.				
3	State the role and functions of the training centre/VET provider.				
4	Conform to the rules and regulations of the training location.				
5	Observe safe practices in the workplace (H&S), maintain a high standard of personal hygiene; lift and handle load safely.				
6	State the supports available to learners (if required).				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
2	EUROPEAN & NATIONAL DRIVE		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to list and describe the key policy and legislative drivers relevant to construction workers behind the move for Nearly Zero Energy buildings NZEB construction.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Identify and outline the acronyms and definitions associated with energy efficient construction.				
2	Explain the impact of EU climate change and energy efficiency policy for building energy performance.				
3	List the actions that are being undertaken under National action plans for energy efficiency and renewable energy deployment in buildings.				
4	Define and describe the key energy principles and requirements for NZEB as they pertain to new and retrofitted buildings.				

ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
5	List the key units used to define the energy efficiency of buildings including kWh/m ² .year and kgCO ₂ /m ² year.
6	Discuss the main changes to Building Regulations in your country over the last 10 years specifically directed to the conservation of fuel and energy.
7	Understand how to keep up to date with changes and amendments to relevant national regulations and national policies.

On completion of the training module learners will be able to:

Climate Change and Policies

KNOWLEDGE:

- a) Outline climate change and global warming
- b) Describe the impacts of global warming and use of greenhouse gases
- c) Identify and list the most relevant European and international energy policies and legislation on building construction and renovation works.
- d) Outline the principles and importance of the EPBD and EED directives
- e) Outline the implications of European and international energy policy on building construction and renovation activity.
- f) Outline the implications of European and international energy policy on renewables sources.
- g) Identify and describe the recent changes to national energy policies which will have implications on the energy efficiency of buildings now and in the future.

On completion of the training module learners will be able to:

NZEB Principles

KNOWLEDGE:

- a) Define the acronym NZEB
- b) Outline the EPBD and EED drivers relevant to energy efficient buildings nationally
- c) Define and describe the key energy principles and requirements for NZEB as they pertain to new and retrofitted buildings.
- d) Explain what is meant by the terminology 'Primary Energy' and 'Delivered Energy'
- e) Define the maximum level of primary energy consumption required to achieve NZEB
- f) Explain the importance of building occupants achieving adequate levels of ventilation, air quality, lighting and thermal comfort.
- g) Describe the key information that should be provided to the dwelling owner so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.
- h) Explain the importance of continuous learning and upskilling in relation to the NZEB standard

On completion of the training module learners will be able to:

National Regulations (to be adapted in each country)

KNOWLEDGE:

- a) List the suite of Building Regulations Technical Guidance Documents (TGDs) in the country
- b) Outline the Building Regulations and relevance to NZEB compliance for new and renovated dwellings
- c) Outline the concepts of "fire safety", "Site preparation and resistance to moisture", "proper materials and workmanship", "sound", "heat producing appliances", "access and use" of the Building Regulations.
- d) Outline the principles of "conservation of fuel and energy" and "nearly zero energy buildings" of the Building Regulations in relation to meeting the NZEB standard.
- e) Outline the key principles of and requirements for "ventilation" of the Building Regulations in relation to meeting the NZEB standard.
- f) Outline the relevance of Standard Recommendation (SR) 325 to NZEB in consideration of such matters as cavity closers, widths and opens, durability, exclusion of moisture, specification of masonry unit and Agreement certification.

- g) Define the acronyms DEAP, 'BER', 'EPC', 'CPC' and 'RER'.
- i) Outline how NZEB relates to the BER scale, in relation to energy savings, comfort, CO2 emissions and cost optimisation using relevant case studies for new and renovated residential buildings.
- h) List the key units used to define the energy efficiency of buildings including kWh/m2.year and kgCO2/m2.year.
- i) Outline the main changes to your national Building Regulations over the last 10 years specifically directed to the conservation of fuel and energy.
- j) Describe how the building standards required for building energy performance and carbon emissions will/can continue to improve in the future.
- k) Understand how to keep up-to-date with changes and amendments to relevant national regulations and national policies.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
-----------------	--------------	-------	-------------------	--	--

		DIRECTED	WORKPLACE	TOTAL
3	ENERGY AND BUILDINGS	1.00	1.00	2.00

MODULE AIM

To equip the learner with the relevant knowledge and skills required to understand the ways in which heat moves in and out of buildings and the ways that this is measured.

MODULE OBJECTIVES

ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
1	The trainer will deliver the following key points for this module Outline the energy profile of buildings in both the residential and non-residential sectors
2	Identify and list energy efficient terms and practical relevance to the energy efficiency of buildings.
3	List and describe the modes of heat transfer
4	Identify the principles of how heat transfer occurs in buildings
5	List and describe the factors affecting energy use and loss in buildings

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Describe the different means by which heat flows occurs in a building.
- b) Describe the consequences of poorly insulated dwellings.
- c) Describe the term "thermal conductivity", including its units, and explain its practical relevance with regards to the energy efficiency of dwellings and achieving NZEB
- d) Describe the term "Psi-value" (or ψ -value), including its units, and explain its practical relevance with regards to the energy efficiency of dwellings.
- e) Describe the term "thermal bridge" including its units and explain its practical relevance with regards to the energy efficiency of dwellings.
- f) Describe the consequences of having poor thermal bridge detailing in dwellings.
- g) Describe the process in which insulation can reduce heat loss from buildings, pipes, vessels and ducts.
- h) Outline the term "air-permeability", including its units, and explain its practical relevance with regards to the energy efficiency of dwellings.
- i) Outline the consequences of having high air permeability in dwellings.
- j) Outline key terms commonly used in relation to moisture movement in buildings including "breathability", "vapour control" and "airtightness".
- k) Outline the effects of temperature reduction on the relative humidity of air and the associated risk of creating conditions for mould and condensation
- l) Outline the term 'psychrometrics' with regards to the relationship between temperature, moisture content and relative humidity.

- m) Outline the term “hygrothermal” in relation to the combined effects of heat and water vapour transfer through the envelope.
- n) Outline the μ -value (pronounced “mu-value”) referring to the “water vapour resistance factor” (a measure of a material’s relative resistance to let vapour pass through in comparison to the properties of air) and explain its practical relevance to external envelope vapour movement in dwellings.
- o) Outline the equivalent air layer thickness (“sd-value”) of vapour control materials (the higher the sd-value, the more resistance to vapour transmittance) and explain its practical relevance to external envelope vapour movement in dwellings.
- p) Describe the terminology “surface condensation” and how insulating certain elements can increase the condensation risk at uninsulated elements.
- q) Describe the terminology “interstitial condensation” and the principle of making materials more vapour permeable as you move towards the external surface.
- r) Outline the importance of a vapour control layer on a timber frame project and projects with internal insulation.
- s) Outline importance of ventilated cavities and how full fill cavities resist moisture ingress.
- t) Outline the potential adverse effects arising from penetrations in the building envelope considering both thermal and moisture movement.
- u) Explain the importance of minimising heat loss through the building envelope.
- v) Describe the term ‘thermal mass’ and ‘surface-to-volume ratio’ and how it can play a role in heat retention in dwellings.
- w) Describe what is meant by “solar radiation” and outline its relevance for energy efficient buildings in relation to solar gain, risk of overheating and renewable energy production.
- x) Outline the benefits of maximising heat gains in buildings through the windows whilst ensuring that buildings do es not overheat.
- y) List key units used to define the energy efficiency of buildings including kWh/m2.year and kgcarbon/m2.year.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
4	BUILDING FABRIC 1 - AIR TIGHTNESS		2.00	2.00	4.00

MODULE AIM

To equip the learner with the basic knowledge and skills required for construction workers to understand and know the importance of airtightness and wind-tightness and how to implement measures to alleviate heat loss

MODULE OBJECTIVES

ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
	The trainer will deliver the following key points for this module
1	Define the term air permeability and describe how the air permeability of a building has an influence on heat losses.
2	List common leakage points in both masonry and timber frame construction types.
3	Outline the benefits that airtightness brings to dwellings.
4	Identify the airtight layer and outline how airtightness can be achieved for different construction forms.
5	Identify and outline the different kinds of air tightness products (tapes, membranes, paint and plaster) that can be used to create long-term airtightness on rough concrete, plaster, wood or membranes.
6	List and outline the consequences of using materials not fit-for-purpose in relation to creating airtightness in dwellings over time, (such as low-quality tapes and silicone sealants which tend to delaminate after a period of some months or year).

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) State the maximum level of air-permeability allowed in the Building Regulations for compliance with NZEB, including its units.
 - b) Outline how the air permeability of a building has an influence on heat losses.
 - c) Define the level of air permeability below which mechanical ventilation is required, including its units.
 - d) Outline the multiplicity of benefits that airtightness brings to dwellings.
 - e) Outline the multiplicity of benefits that wind-tightness brings to dwellings.
 - f) List common leakage points in both masonry and timber frame construction types.
 - g) Outline the key concept of “unbroken continuity” as it relates to the formation of a highly airtight building.
 - h) Explain the permeability of different kinds of vapour control layers (“vapour impermeable”, “vapour semi-impermeable”, “vapour semi-permeable” and “vapour permeable”).
 - i) Describe the consequences of placing the incorrect type of vapour control layer on an external assembly with regards to vapour control, mould formation and the risk of interstitial condensation.
 - j) Outline the rationale of having lower vapour permeable materials on the inside of the thermal envelope compared to materials of higher vapour permeability on the exterior.
 - k) Outline the importance of providing adequate ventilation to a dwelling when there is an increased level of airtightness.
 - l) Outline the best practice techniques and types of materials that can be used to retain the airtight layer in the building.
 - m) Explain the importance of minimising the number and size of holes in the airtight layer.
 - n) Outline the benefits of creating a ‘service cavity’ in relation to the airtightness of a building.
 - o) Explain the importance of not reducing the effectiveness of the installed airtightness and vapour control layer through removal or damage.
 - p) Outline the benefit of completing an early initial airtightness test and possible need for further air tightness tests.
 - q) Outline when the final airtightness test can be carried out for a dwelling.
 - r) Explain the optimal positioning of the airtightness and / or vapour control layer for your climate zone.
 - s) List and outline the consequences of using materials not “fit-for-purpose” in relation to creating airtightness in dwellings over time, (such as low-quality tapes and silicone sealants which tend to delaminate after a period of some months or year).
 - t) Outline how to connect different material types in terms of airtightness, including the sequence of tasks that should be followed in order to ensure that the most optimal result is obtained.
-

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Identify and label the airtight layer and its constituent parts on construction drawings.
 - b) Demonstrate application of appropriate materials including tapes, membranes, and caulks in order to create permanent airtight seals around external envelope junctions and penetrations
 - c) Identify the presence of air-leaks in thermographic images.
-

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Explain the importance of taking responsibility to report to the site foreman/supervisor where unavoidable air leaks have been created as a result of plasterers’ work.
 - b) Explain the importance of sequencing of works on the building site with respect to achieving high levels of airtightness.
 - c) Explain how penetrations through the airtightness envelope should be at a minimum and planned before works commence.
 - d) Demonstrate the importance of not reducing the effectiveness of installed airtightness tapes and membranes through removal or damage.
 - e) Describe a scenario whereby assistance might be required from other experienced tradesperson on the building site in order to mitigate air tightness effects of all service penetrations
-

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
5	BUILDING FABRIC 2 – INSULATION AND THERMAL BRIDGING		2.00	2.00	4.00

MODULE AIM

To equip the learner with the basic knowledge and skills required for construction workers to understand and know the importance of having a continuous insulation envelope and how to implement measures to prevent heat loss

MODULE OBJECTIVES

ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
1	The trainer will deliver the following key points for this module Outline the principles of continuous insulation and thermal bridging.
2	Outline the importance of creating a continuously insulated thermal envelope in order to reduce heat loss through the building fabric.
3	Identify the insulation layer(s) in a range of construction drawings for the external envelope.
4	Outline the terms thermal conductivity, thermal resistance and U-value and identify the units of measurement used for them.
5	Outline the importance of avoiding thermal bridging in energy efficient / NZEB buildings.
6	Identify how to prevent thermal bridging at junctions using Best Practice details.
7	Outline the risks associated with poor workmanship relating to continuity of the insulation layer by considering reducing the number and size of service penetrations.

On completion of the training module learners will be able to:

Continuous Insulation

KNOWLEDGE:

- a) Describe the three principle means of reducing heat losses from buildings, (through increased insulation, limiting thermal bridging and limiting air permeability).
- b) Describe the importance of creating a continuously insulated thermal envelope in order to reduce heat loss through the building fabric.
- c) Describe the role of construction workers in supporting masonry and timber frame construction insulated buildings.
- d) Identify the insulation layer(s) in a range of construction drawings for the external envelope (typical roof, wall and floor assemblies for both masonry and timber frame construction).
- e) Identify correct certified insulation products and systems to be used for all construction types for the external envelope.
- f) List the thermal conductivity values for key insulation types used in masonry and timber frame constructions.
- g) Describe the risks associated with poor workmanship relating to continuity of the insulation layer by considering reducing the number and size of service penetrations.
- h) Outline how penetrations will affect the effectiveness of the insulation layer for typical roof, wall and floor assemblies for both masonry and timber frame construction, using case studies
- i) Outline the types of insulation products that can be used for fire stopping with external wall insulation systems.
- j) Outline the differences in terms of thermal and structural properties between conventional concrete blocks, autoclaved aerated concrete (AAC) blocks and clay-based bricks/blocks.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate the selection and affixing of suitable insulant for external wall insulation systems and roof level in a dwelling.
 - b) Demonstrate the selection and affixing of suitable insulant for external wall insulation systems where firestopping is required at separating walls between dwellings/buildings.
-

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Describe the importance of not reducing the effectiveness of installed insulation through removal or damage.
 - b) Describe a scenario whereby remedial assistance from others would be required in order to ensure continuity of the insulation.
 - c) Describe the risks associated with poor workmanship relating to continuity of the insulation layer by considering reducing the number and size of service penetrations.
-

On completion of the training module learners will be able to:

Thermal Bridging

KNOWLEDGE:

- a) Describe the term “thermal bridging”.
 - b) Describe the practical relevance of thermal bridging with respect to energy efficiency and NZEB compliance for dwellings.
 - c) Identify where thermal bridges typically are commonly found in dwellings for both masonry and timber frame construction and why they typically occur at such locations (window jambs, lintels, sills, intermediate floors, roof wall junction, wall floor junction, chimney, structural steel and thresholds).
 - d) Outline the impact of ‘repeating’ thermal bridges, such as those created by timber studs within the insulation layer.
 - e) Describe the importance of not creating thermal bridges through the removal, damage or poor installation of insulation.
 - f) Outline the most commonly used interventions to prevent or reduce thermal bridging.
 - g) Identify the types of external wall insulation that are suited for use below the DPC levels with regards to water absorption.
 - h) Illustrate with a sketch where AAC blocks can be used in wall construction to reduce thermal bridging.
 - i) Outline the adverse impact of moisture on the insulation properties of AAC blocks.
 - j) Outline the adverse thermal bridge effect of using metal fixings for external wall insulation systems.
 - k) Outline the potential adverse structural impacts to the building when thermal bridging occurs, with regards to risk of mould and condensation (surface and interstitial).
 - l) Describe the potential adverse health impacts to occupants of the building when thermal bridging occurs, with regards to risk of mould and condensation.
 - m) Identify thermal bridges using thermographic images.
-

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate the best practice installation of external wall insulation at the base of the wall
 - b) Demonstrate the best practice installation of external wall insulation at the top of an external wall for both ventilated and unventilated roofs. This detail needs to include appropriate placing of firestopping insulant at the location identified in the certification detail.
 - c) Demonstrate the best practice installation of insulated cavity closers on sill, jamb and head of window and door opens in wall construction achieving maximum continuity of the insulation layer for all insulation scenarios.
-

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Describe a scenario whereby assistance might be required from other experienced insulation applicators on the building site in order to mitigate thermal bridge effects.
 - b) Describe a scenario whereby assistance might be required from other experienced tradesperson on the building site in order to mitigate thermal bridge effects of all service penetrations.
 - c) Describe the importance of not reducing the effectiveness of installed insulation through removal or damage.
-

On completion of the training module learners will be able to:

Windows and Doors

KNOWLEDGE:

- a) Outline the energy efficiency and comfort related function of windows highlighting their role in relation to thermal protection, solar gains and ventilation.
 - b) Outline the best practice procedures regarding placement of windows, sills, and floors in the insulation layer with special emphasis on fire safety and thermal retention. Consider all types and positions of the insulation layer.
 - c) Outline the optimal horizontal positioning of windows and doors in the external envelope with regards to ensuring continuity of the insulation layer.
 - d) Outline the importance of connecting the windows and doors to the insulation layer.
 - e) Outline the benefits of overlapping the window frame with insulation on externally insulated wall systems to best practice.
 - f) Outline the benefits of ensuring the air tightness layer is installed between the window frame and the wall to best practice.
-

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Identify and label the different taping approaches that can be used to create a permanently airtight connection between the window / door and the airtight / vapour control layer (prior to installation, post-installation, taping to external or internal face of frame, taping to side or exposed face of frame).
 - b) Select appropriate tapes, membranes and sealants that can be used to connect windows and doors to the external envelope, including those that can be directly plastered-over.
 - c) Demonstrate the overlapping of insulation on the external face of the window frame head and jambs when using an external wall insulation system to best practice.
 - d) Demonstrate the insulation to the underside of the window sill when using an external wall insulation system to best practice.
-

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Describe the importance of working closely with window installers to ensure the optimal fitting detail is achieved with respect to airtightness and thermal insulation.
 - b) Demonstrate the optimal preparation of window and door frames for affixing airtightness products, including removal of protective films, covers and labels as well as ensuring clean and dust-free surfaces.
-
-

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
6	HEATING AND COOLING SERVICES		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand principles of energy efficient Space Heating and Cooling and Domestic Hot Water					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Outline why space heating and domestic hot water provision is typically one of the highest sources of carbon emissions from a dwelling.				
2	Outline why all hot water storage vessels, pipes and ducts associated with the provision of heating and hot water should be fully insulated.				
3	Understand the relationship between providing heating and cooling with energy savings, operational costs and levels of comfort of the occupiers.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Explain in outline why heating and domestic hot water provision is typically one of the highest sources of carbon emissions from a dwelling.
- b) Explain in outline why all hot water storage vessels, pipes and ducts associated with the provision of heating and hot water should be fully insulated.
- c) Describe in outline why water pipes and storage vessels in unheated areas need to be insulated for the purpose of avoiding condensation as well as protection against freezing.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate ability to read and interpret drawings relating to applications commonly used to maximise the energy performance of NZEB dwellings.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
7	VENTILATION		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand principles of Controlled Ventilation systems					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Outline the principles of ventilation and the types of ventilation systems suitable for different buildings.				
2	List and describe the causes of condensation and mould growth within the building envelope and how they may be avoided.				
3	Outline the main requirements of current building regulations for ventilation.				

On completion of the training module learners will be able to

KNOWLEDGE:

- a) Outline natural/background/mechanical ventilation
- b) Outline the air permeability requirements of dwellings for different appropriate ventilation strategies to ensure compliance of the national Building Regulations and NZEB standards
- c) Define the air permeability conditions that allow natural ventilation to be used.
- d) Outline best practice scenarios governing the use of natural ventilation, including sizing and placement of background ventilators to achieve Building Regulation and NZEB compliance
- e) Describe the different kinds of controlled ventilation systems that can be used for different types of dwellings (continuous, intermittent, whole-house individual room, with and without heat recovery, demand controlled etc.).
- f) Explain why the importance of controlled ventilation increases with decreasing air permeability.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the appropriate levels of ventilation for rooms in the dwelling and for the comfort of the occupants to be compliant with Building Regulations and NZEB standards.
- b) Demonstrate installation of background ventilators in an external wall, minimising tightness of fit in the insulation layer and achieving an airtight connection to the airtightness layer.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
8	ADAPTING TO CLIMATE		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand the principles and importance of healthy comfortable buildings					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Identify and list the factors affecting occupant comfort in buildings.				
2	Outline why it is important to adapt construction methods and materials to different climates.				
3	Identify and outline the impact of indoor and outdoor air contaminants on buildings.				
4	Discuss a scenario to achieve a healthy indoor climate.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Describe the key factors that affect occupant comfort in a building, including temperature, relative humidity, air speed and indoor air quality.
- b) Outline what is meant by “solar radiation” and outline its relevance for energy efficient buildings in relation to solar gain, risk of overheating and renewable energy production.
- c) Identify criteria for comfort in buildings and healthy indoor climate, including indoor air quality, thermal comfort, daylight and lighting, noise, connection to the nearby landscape.
- d) Outline the criteria for thermal comfort and relevant applicable regulation and standards
- e) Identify the source and outline indoor air contaminants and recommended levels for acceptable indoor air quality (including condensation, humidity and mould appearance, CO2 levels, radon, VOCs).

- f) Outline the criteria for acoustic indoor environment comfort, including noise and vibration generation and accepted levels.
- g) Outline the criteria for visual comfort, including light and glare conditions.
- h) Outline health and safety requirements in buildings for comfort, lighting and air quality.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate the criteria and added benefits in terms of comfort / healthy indoor climate including aspects of indoor air quality, thermal comfort, daylight and lighting, noise levels.
- b) Prepare a sketch illustrating the performance levels for indoor air quality and outline the main risks regarding the effects of these pollutants,
- c) Outline criteria for visual comfort, and requirements for lighting and glare;
- d) Identify the main factors influencing indoor comfort during summer and describe their influence with regards to:
 - the link between heat gains in summer and: building orientation and transparent surfaces, shading, effectiveness of indoor and outdoor blinds,
 - the impact of indoor heat sources and provide generic solutions how to reduce them,
 - the impact of external surfaces colours, thermal insulation and internal thermal masses,
 - the influence of fluctuating internal loads on indoor comfort in summer;
- e) Demonstrate communication skills to liaise with other workers and explain the importance of comfort, health and safety requirements in buildings.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate competency within the guidelines of work related to indoor comfort and health risks issues.
- b) Demonstrate competency in decision making regarding specific solutions to achieve comfort based on the coordination of own work with other responsible persons.
- c) Describe the guidelines of work related to health and safety regulations at work.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
9	COLLABORATION AND COMMUNICATIONS		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the relevant knowledge and skills required to understand and know the importance of working together onsite to achieve quality NZEB buildings and communicate effectively.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Understand the importance of working together onsite as a team (System Thinking) to achieve quality NZEB buildings.				
2	Outline how different people at different times are responsible for executing and managing certain aspects or elements of construction to ensure quality, energy efficient healthy construction.				
3	Identify and demonstrate how poor workmanship can impact the energy performance of a building.				
4	Outline the principles of quality building and the sequencing of works to construct energy efficient healthy buildings.				

5	Outline how good communication can help to create energy efficient / NZEB buildings.
6	Outline the broad training provision for building construction workers and the tasks associated with each of their individual disciplines and importance of continuing skills development.

On completion of the training module learners will be able to:

Collaboration

KNOWLEDGE:

- a) Demonstrate collaborative teamwork and “system thinking” on-site with all trades
 - b) List key aspects that require excellent communication on-site, especially the strategies being used for airtightness, vapour control, continuous insulation and thermal bridging to achieve NZEB compliant dwellings
 - c) Outline what role the construction worker will play in delivering the airtightness strategy, including recognising when specialist external expertise might be required.
 - d) Outline the key sequences that must be followed in order to meet the airtightness targets and communicate these to the foreman/supervisor and all relevant trades.
 - e) Describe the consequences of other trades adversely impacting the airtight and vapour control layer, consider plasterboard installers ‘slabbers’ and others pulling through cables or installing pipes.
 - f) Understand where the construction worker may be liable for failures, for example exceeding specified airtightness targets or failure to provide correct levels of airtightness.
 - g) Understand what envelope penetrations will be required by discussing with site foreman/supervisor and other disciplines, before works start.
-

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the concept of ‘system building’ and outline how it differs from the use of the classic trades working independently on a project.
 - b) Explain the importance of sequencing of works on the building site with respect to achieving high levels of insulation.
-

On completion of the training module learners will be able to:

Communication and Knowledge Transfer

KNOWLEDGE:

- a) Explain the importance of ensuring good communication between all members of the construction team to achieve NZEB compliant dwellings.
 - b) Explain the importance of communicating closely with all other trades on the building site with regards to achieving a successful outcome in relation to airtightness.
 - c) Understand the details specified in construction drawings with respect to thermal bridging, air tightness, continuous insulation and window positioning.
 - d) Understand the importance of relevant information being provided to the home/building owner to ensure that the building is operated and maintained to its optimum, including special emphasis on energy efficiency.
 - e) Explain the importance of continuing professional development CPD, (continuous training) and association with relevant national quality assurance standards.
 - f) Understand where CPD and future accredited trainings can be obtained in relation to the NZEB standards.
-

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Describe the risks associated with poor workmanship related to building fabric.
 - b) Describe a scenario when clarification and guidance should be sought from the supervisor / project design team and specialists pertaining to elements in the building fabric and services.
-

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
10	RENEWABLES		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required for construction workers to understand the principles and benefits of Renewable Energy.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Identify examples of the different types of sources and technology that qualify as providing renewable energy.				
2	Outline and discuss renewable energy technologies suitable for space heating and cooling, and water heating				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Identify and outline relevant sources to be categorized as renewables.
- b) Outline the minimum level of energy provision required from renewable energy technologies to comply with NZEB requirements.
- c) Describe in outline “renewable energy technologies” and cite examples of the different types of technology that qualify as providing renewable energy.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
11	ENERGY RENOVATION		1.00	1.00	2.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand the principles of using suitable materials and energy efficient equipment for renovating buildings.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Discuss the implications of upgrading the energy performance of existing building stock on skills for construction workers.				
2	Outline how to achieve low-Risk, high-impact energy renovation works using suitable materials and systems (technologies, equipment, controls).				
3	Outline the importance of the choice of “fit for purpose” materials and products in traditional or protected buildings to maintain a healthy, energy improved building.				
4	Identify and outline how to detect building defects using case studies.				
5	Outline the best practice procedures regarding placement of windows, window sills, and floors in the insulation layer with special emphasis on fire safety and thermal retention.				
6	Outline the results of cost effectiveness assessment.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Describe the most commonly used renovation interventions to prevent or reduce thermal bridging.
- b) Outline the importance and impact of the building renovation by not creating thermal bridges through the removal or damage of insulation.
- c) Identify and outline the most critical locations (including junctions) where achieving airtightness is a challenge.
- d) Outline the importance of the sequence of tasks that should be followed in an airtightness strategy in order to ensure that the most optimal result is obtained.
- e) Outline the benefit of completing an early initial airtightness test.
- f) Outline the importance of not reducing the effectiveness of the installed airtightness and vapour control layer through removal or damage.
- g) Identify where specific moulds are commonly found and solutions to rectify building structural and health issues.
- h) Outline the choice of controlled ventilation systems that can be used for different types of renovation works to dwellings (continuous, intermittent, whole-house individual room, with and without heat recovery, demand controlled and others).
- i) List and identify suitable renewables/technologies to achieve NZEB/low energy renovation
- j) Demonstrate benefits of replacing and positioning light bulbs in a renovation.
- k) Identify and explain the importance of materials and equipment of which are fit for purpose. (Know the appropriate materials and equipment for their specific usages).
- l) Outline the risks associated with poor workmanship related to removal or damage of materials and equipment.
- m) Identify the purpose and priority of the renovation with regards to reduced energy consumption, reduced energy costs, building certification, switching to green energy and/or energy autonomous building.
- n) Identify the benefits of integrating RES installations, storage systems and building automation in relation to reduced energy consumption, reduced energy costs, building certification, switching to green energy and/or energy autonomous building.
- o) Identify and explain the importance of a Step-by-step renovation plan and sequencing.
- p) Identify and outline cost analysis comparisons to achieve NZEB renovation using best practice case studies.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate the ability to interpret the advantages and specific challenges encountered in step-by-step energy renovation.
- b) Identify and label opportunities for energy savings.
- c) Demonstrate ability to careful and close liaison with other team members and foreman/supervisor in a proactive manner for problem solving to maximise energy efficiency and comfort.
- d) Demonstrate how to sequence the installation of a window with external insulation/internal insulation (based on the different steps and their sequence).
- e) Demonstrate how to achieve an airtight insulated renovation using the red (air tightness) and yellow (continuous insulation) line test.
- f) Demonstrate how to input into an air tightness plan in the traditional way and using a collaboration tool (based on the different steps and their sequence).

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Explain the importance of the roles and responsibilities for communicating and collaborating with other team members on the different measures and steps needed to complete an energy renovation project.
 - b) Ability to use materials that are suitable for the construction type.
 - c) Describe the importance of not reducing the effectiveness of airtightness and insulation through removal of materials or services.
 - d) Describe a scenario when clarification and guidance should be sought from other specialist team members and supervisor pertaining to the renovation strategy and system.
 - e) Demonstrate the concept of 'cost-optimisation' and effects of the choice of materials and teamwork can achieve cost effective renovation.
-

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
12	LIGHTING AND SMALL POWER		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand acceptable levels of light and lighting ICT					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline why lighting constitutes significant regulated electrical loads in residential buildings.				
2	Identify current lighting technologies, controls and upgrade opportunities.				
3	Outline the energy labelling used for light bulbs and appliances.				
4	Understand the optimal daylight needs of occupants and in buildings.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Outline why lighting constitutes significant regulated electrical loads in dwellings.
- b) Identify the different types of lighting that can be used in dwellings with regards to energy efficiency in compliance with NZEB standards.
- c) Outline the role of the construction workers, including cross-crafting issues, required to ensure that the design intent for the lighting and ICT strategies are met.
- d) Outline the sequencing of tasks typically required to deliver the design intent for the lighting and ICT strategy.
- e) Outline typical smart electrical appliances e.g. smart fridge and how they can be controlled by homeowner and/or energy provider.
- f) Outline the energy labelling used for light bulbs and appliances.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Identify and label poor standards of execution and / or design on construction models / drawings of lighting and ICT systems.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Describe a scenario when clarification and guidance should be sought from the supervisor and specialists pertaining to lighting and ICT systems.
- b) Outline the importance of not reducing the effectiveness of airtightness and insulation through removal or damage of lighting services.
- c) Outline recent and emerging innovations in energy efficient lighting.
- d) Demonstrate how to keep up-to-date with emerging technologies.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
13	SMART CONTROLS AND METERS		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand Smart Controls and Smart Metering.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline how an occupant and/or energy provider can be control efficiently smart electrical appliances				
2	Outline the benefits on how Smart Controls can support the construction of NZEB building.				
3	Outline how a smart meter works concerning import and export of electrical energy from the home.				
4	Identify emerging technologies in the smart metering, smart appliance sectors.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Identify current and emerging smart technologies that can be used to remotely control building services in the home as they relate to energy efficiency, including heating and domestic hot water.
- b) Outline the various means by which internet and Wi-Fi can be provided throughout a dwelling.
- c) Outline the various means by which telephone, intruder alarm and satellite television can be provided throughout a dwelling.
- d) Outline how a smart meter works concerning import and export of electrical energy from the home.
- e) Outline the best practice installations required for the charging of electric vehicles.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Define occupancy sensors (including PIR) which can be used to reduce lighting loads in infrequently used spaces and identify appropriate placement of such sensors.
- b) Describe how a smart meter works concerning import and export of electrical energy from the home.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the competent use of commonly used smart technologies (including mobile ‘apps’) for the purposes of reducing heating and domestic hot water energy use in a dwelling.
- b) Describe recent and emerging innovations in energy efficient smart metering, ICT, smart appliance, electricity storage and electrical vehicle sectors.
- c) Demonstrate how to keep up-to-date with emerging IT and smart technologies.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
14	MEASURING PERFORMANCE		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand the principles of acceptable U-values and achieving compliance using the Energy Assessment Procedures EAP.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Outline the importance of using elements with low U-values in buildings				
2	List the minimum U-values required by current National Building Regulations				
3	Outline the principles of heat loss calculations for walls, floors and roofs				
4	Outline the role and importance of Energy Assessment Procedures EAPs				
5	Case study demonstrating scenarios in energy consumption and CO2 emissions				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Describe the term “R-value”, including its units, and explain the practical relevance, with regards to the energy efficiency of dwellings and achieving NZEB.
- b) Describe the terms “U-value”, including its units, and explain the practical relevance, with regards to the energy efficiency of dwellings and achieving NZEB.
- c) Outline the typical construction build ups required to achieve different U-values.
- d) List the minimum backstop U-values required for different elements of the building envelope in meeting NZEB compliance.
- e) Outline a simplified U-value calculation for a wall, floor or roof assembly using case studies.
- f) Identify and outline where to find information on “real” U-value requirements for insulation using case studies.
- g) Identify and outline the principles of building energy performance certificates.
- h) Identify the national software EAP tool and outline its relevance to demonstrating building regulations and/or NZEB compliance.
- i) Outline the role of the national EAP when changes are proposed for the building’s materials and services need to be checked in EA to determine whether the NZEB standard can still be met.
- j) Outline the key content of an EAP summary report pertaining to meeting the NZEB standard.
- k) Identify and label other software tools - Nationally recognized tools and BIM tools used to provide energy performance.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate the principles of a U-value calculation using case studies.
- b) Demonstrate the principles of issuing energy performance certificate and its results.
- c) Demonstrate the principles of the software tools for calculations related to energy performance certificate.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the importance of the results of the energy performance certificates of buildings.
- b) Identify the person responsible for performing comparison of investment costs and related energy cost savings using case studies.
- c) Identify the person responsible for performing calculations related to energy performance certificate or to energy audit using case studies.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
15	SMART CITIES AND DISTRICTS		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand the principles of smart cities, districts and neighbourhoods, and energy communities					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Outline the impact and benefits of the distributed electrical energy generation grid integration.				
2	Outline the framework for energy management, tariffs and inter-connection and inter-operability of energy systems.				
3	Identify energy management systems and quality assurance framework.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Identify the main characteristics of the Factual and theoretical knowledge on District Energy Systems, Advanced Distribution Automatisatation and EMS.
- b) Outline the principles of combined heat and power (CPH) in meeting the renewable energy targets in a district or city.
- c) Identify the factual and theoretical knowledge of general definitions and concepts – technical aspects and business models for energy cooperatives.
- d) Outline the principles of the framework for energy management, tariffs and inter-connection and interoperability of energy systems for energy cooperatives.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Demonstrate the ability to identify and explain the energy systems within the neighbourhood.
- b) Demonstrate the ability to identify the pattern of energy use in the selected neighbourhood.
- c) Demonstrate the ability to identify the local potential for use of RES.
- d) Identify and list such systems and understand basic operation and associated benefits (costs, emissions, commercial) for energy cooperatives.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the correct understanding of the principles of a defined system in energy cooperatives.
- b) Identify what procedure could be followed in recommending actions to optimize the functionality of a defined system for energy cooperatives.

CIRCULAR ECONOMY

Circular Economy in Construction (EQF level 5)

TRAINING AIM

The aim of the programme is to increase the learners' knowledge of circular economy principles, techniques and practices applied to construction. This improved knowledge will allow construction workers to apply their existing skills, so that relevant green circular measures and standards are achieved.

PROGRAMME OBJECTIVES

SEQUENCE NUMBER	ACTIVITY STATEMENT
1	On completion of the training programme learners will be able to: Understand how the key circular economy policy drivers impact on each profession in the construction industry.
2	List and describe the key phases, principles and impacts related to life cycle assessment and costings to support circular economy in the construction sector.
3	Identify best practice strategies using a number of construction methods and tools relevant to life cycle assessments and be able to recognise work practices that fall below this standard.
4	Outline some key challenges in implementing circular economy projects and how to apply specific solutions to meet those challenges.
5	Outline the guidelines based on the EU Construction and Demolition Waste management protocol with particular reference to minimising the quantities of other resources being used.
6	Understand why there is need to talk and discuss with other trades in order to achieve circular buildings through collaborative teamwork.

OUTLINE TRAINING PLAN

MODULE NUMBER	DESCRIPTOR	Duration Hours
1	Introduction	1.00
2	European & National Drive EU Circular Economy Principles Green Policies for construction National Regulations	1.00
3	Introduction to Circular Economy Introduction to Sustainability Embodied Carbon in the built environment Principles of Circular Economy	2.00
4	Circular Economy and Construction Circular interventions Sustainable Development Goals Green Certification Schemes and circularity	3.00
5	Waste and Resource Management Waste Management Pre-demolition, pre-development audits Demolition, reuse, recycle, repurpose	3.00
6	Adaptable Materials and Systems Circular materials and systems in buildings Construction Techniques for Circular	2.00
7	Water Management Water Management Plan Water Management on site	2.00
8	LEAN and Modular Construction Lean Construction Modular Construction	1.00

MODULE NUMBER	DESCRIPTOR	Duration Hours
9	Life Cycle Assessment	2.00
	Introduction to LCA LCA and Level(s) Building Certifications	
10	Life Cycle Costing	2.00
	Introduction to LCC LCC Strategy	
11	Collaboration and Communications	3.00
	Collaboration	
	Roles and Responsibilities Communication Tools	
12	Green Procurement	2.00
	Introduction to GPP	
	Tendering and Circular Procurement Certification and Eco Labels	
13	Certification in Construction	1.00
	Environmental Product Declaration (EPD)	
	Product Environmental Footprint (PEF) Ecolabels	
14	Using Building Circularity Tools	3.00
	Building Circularity Tools (LCA & LCC) Calculation Methodology	
Total duration in hours (days)		28 hours (4 days)
Number of Hours	1-2 hours theory + 1-2 hours practical lessons per week or Full Time Total: 60 hours – 23-25 hrs contact, and 35-37 hrs self-directed study (based on chosen modules)	
Delivery	Blended	
Type of discipline	e-learning tools, facilities for practical demonstration and training, and assessment/ examination procedures	
EQF level	5	
Preliminary requirements	The students are expected to have some general knowledge on building physics & building materials, building construction basics.	
Assessment procedure	Continuous Assessment (incl. drawings done on site) and option of an oral examination/ presentation.	
Technical secure (hardware and software)	White board Multimedia facility Demonstration models Practical training models Samples of components and materials, suitable for deep renovation Demonstration videos	
Lectures	Online facility Classroom facility Expert guest speakers/trainers	
Resources	Moodle platform (or equivalent) Induction pack: structure of programme, registration info, introduction to programme, helpdesk details and forum) Learning resources: reading resources, videos, materials, etc.	

SEQUEN- CE NUM- BER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
1	INDUCTION		1.00	0.00	1.00
MODULE AIM					
State the planned outcomes and the conditions attached to the attendance on the course; apply good safety, health and hygiene practices; understand the rules of the centre and explain the meaning of equal opportunities.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
The trainer will deliver the following key points for this module					
1	State the aim and outline the objectives of the training programme, the certification that is available and get to know fellow learners.				
2	Identify different learning styles and delivery used for the training and outline the structure and indicative programme of the training.				
3	State the role and functions of the training centre/VET provider.				
4	Conform to the rules and regulations of the training location.				
5	Observe safe practices in the workplace (H&S), maintain a high standard of personal hygiene; lift and handle loads safely.				
6	State the supports available to learners (if required).				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Conform to the rules and regulations of the training centre.
- b) Observe safe practices in the workplace (H&S), maintain a high standard of personal hygiene.
- c) Listen to others with respect.
- d) Accept responsibility for individual independent learning.
- e) Accept professional ethical standards.
- f) Demonstrate a willingness to present personal views and participate in group/class discussions.
- g) Show sensitivity towards individual differences and opinions.
- h) Complete the feedback surveys to assist with improvements of the programme.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
2	EUROPEAN & NATIONAL DRIVE		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the relevant knowledge and skills required to list and describe the key policy and legislative drivers for a circular economy relevant to construction workers.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Outline the key terms, units and definitions associated with circular economy.				
2	Explain the key principles and drivers behind the transition to a circular economy at EU level.				
3	Outline the impact of climate change and circular policies related to the built environment.				
4	List the policies that are relevant at national level for circular economy and circular buildings.				
5	Understand how to keep up-to-date with changes and amendments to relevant environmental and circular national policies.				
6	EU Construction and Demolition Waste Protocol.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Identify and outline the drivers behind the transition to a sustainable circular economy at EU level.
- b) Identify and outline the most relevant European and international circular policies and legislation on building construction and renovation works.
- c) Outline the principles and importance of the EU Green Deal Pact.
- d) Outline the principles and importance of the EU Circular Economy Action Plan.
- e) Outline the principles and importance of the UN 2030 Agenda for Sustainable Development Goals for the built environment.
- f) Outline the EU Construction and Demolition Waste Protocol.
- g) Outline the implications of European and international green policies on renewable and circular sources.
- h) Identify and outline the drivers behind the transition to a Circular Economy at National level.
- i) Identify and describe the recent changes to national policies which will have implications on the environmental and circularity of buildings now and in the future.
- j) Identify where to keep up to date with changes and amendments to circular and environmental policies.
- k) Describe how the building energy performance, carbon emissions and circularity will/can continue to improve in the future.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
3	INTRODUCTION TO CIRCULAR ECONOMY		2.00	0.00	2.00
MODULE AIM					
To equip the student with the basic knowledge required to understand the principles of the circular economy across the built environment.					

MODULE OBJECTIVES	
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
1	The trainer will deliver the following key points for this module Define Embodied Carbon and importance for the life cycle of the built environment.
2	Identify and outline sustainability challenges within the built environment in the context of circularity.
3	Identify the principles of circularity and their application to the built environment.
4	Identify and outline issues to maintain a circular economy strategy taking consideration of land and materials use, biodiversity, and air, water and soil pollution.
5	Identify and outline circular challenges within the built environment, and the associated environmental impacts.

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define circular economy (European commission definition).
- b) Outline the key carbon terms and units associated with the existing built environment.
- c) Outline the principles of circular economy in context to the built environment.
- d) Outline the importance of circular economy for the built environment.
- e) Outline the relationship between circular economy and sustainable development.
- f) Outline the benefits of a circular economy on environmental, social and economic levels.
- g) Explain the differences between linear and circular economy.
- h) Explain what is meant by closed and open loop.
- i) Outline the types of circular challenges and environmental impacts on the built environment.
- j) Outline the impact of the 2030 Agenda to the built environment and circular economy.
- k) Outline the principle of avoiding the generation of waste and pollution by design.
- l) Outline the strategies to increase circularity in product design (9R Framework).
- m) Explain why products and materials should be in use as long as possible.
- n) Understand the purpose of the technical and biological cycles in the circular economy systems diagram.
- o) Demonstrate responsibility for maintaining and following circularity best practices.
- p) Identify challenges to establish a circular economy taking consideration of land and materials use, biodiversity, and air, water and soil pollution.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the importance of collaboration and engaging stakeholders in circularity.
- b) Demonstrate a willingness to present personal views on the topics presented and participate in class discussions.
- c) Show sensitivity towards individual differences and opinions.
- d) Discuss how to transform the built environment into a circular economy.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
4	CIRCULAR ECONOMY AND CONSTRUCTION		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the relevant knowledge required to understand how the transition to a circular economy will affect the construction industry.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Outline how the move to a circular economy can change the ecosystem and value chain during all phases of the building life.				
2	Outline a range of specific actions to support the transition to circular construction.				
3	Introduce the circular impacts of the 2030 Agenda and the steps for Sustainable Development Goals SDGs relevant to the built environment.				
4	Identify and outline possible circular solutions in terms of sustainable, green, energy, water and waste management using case studies.				
5	Outline the importance and impact of “design-led” circular economy interventions in construction.				
6	Identify and outline the principles of the green building certification schemes in relation to the construction supply chain and circular economy.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Outline the importance of circular economy for construction.
- b) List and outline the principles of circular economy relevant to the construction industry and buildings.
- c) Understand which levels should be integrated into the principle’s circular economy in construction.
- d) Outline how circular affects the value chain for the design, construction, operation, renewal and repurposing of buildings.
- e) Explain the environmental impacts for all phases of construction associated with the construction sector.
- f) Outline circular economy strategies for all phases of construction associated with the construction sector.
- g) Outline circular economy strategies for the unavoidable demolition of a building.
- h) Outline the implementation of circular economy principles during the design and construction phases.
- i) Outline the implementation of circular economy principles during the maintenance and operational phases.
- j) Identify and outline the Sustainable Development Goals.
- k) Identify the impacts of the Sustainable Development Goals on the construction sector.
- l) Outline the steps of the Sustainable Development Goals relevant to the construction sector.
- m) Identify and list different Sustainability Assessment Methods.
- n) List and outline the principles and benefits of different Sustainability Assessment Methods on construction.
- o) Compare the differences between a number of Sustainability Assessment Methods (such as BREEAM and LEED).
- p) Explain the importance of a whole life cycle target for a building.
- q) Outline whole life carbon assessment for the built environment.
- r) Understand the need to design waste and pollution, keep products and materials in use and regenerate natural resources in a construction project.
- s) Describe the impacts circular economy can have on the construction industry and your work.
- t) Discuss how to address the challenges of circular economy for a particular construction project.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Demonstrate the importance of collaboration and engaging stakeholders in circularity.
- b) Demonstrate a willingness to present personal views on the topics presented and participate in class discussions.
- c) Show sensitivity towards individual differences and opinions.
- d) Demonstrate the importance of taking responsibility for your actions in ensuring circular principles are considered during construction works.
- e) Demonstrate responsibility for evaluating and following circularity best practices.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
5	ADAPTABLE MATERIALS AND SYSTEMS		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the relevant knowledge required to understand the impact of material and systems selection, use and installation for circular buildings.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Explain the impact that material and system selection can have on resource consumption, building carbon emissions and life cycle.				
2	Understand the importance of installing circular materials during the retrofit of existing buildings.				
3	Outline challenges in maintaining the value of materials and products in the economy for as long as possible, reducing resource use and preventing waste on site.				
4	Outline the use of construction techniques that promote the durability of buildings and the resilience of the materials.				
5	Outline the use of construction techniques that promote the adaptability of buildings.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define embodied carbon and its importance for the life cycle of construction.
- b) Explain the principles of embodied carbon for the construction of buildings.
- c) Define the principles for selecting low embodied energy materials and products.
- d) Outline each stage where carbon emissions occur for the building's carbon footprint.
- e) Explain the distinction between natural and processed building materials using examples.
- f) Describe the consequences of using non-circular materials over the life cycle of a building (case studies).
- g) Describe the importance of choosing adaptable and circular materials.
- h) Outline the importance of specifying materials which allow for the variations in reclaimed materials.
- i) Compare the embodied carbon for a number of insulation materials (low carbon insulation with a high carbon).
- j) Outline the importance of eliminating toxic materials (VOCs) at any stage of their life cycle.
- k) Outline the importance of not generating excessive or hazardous waste at the end of its useful life.
- l) Outline the challenges in establishing costly maintenance work.
- m) Explain the environmental damage due to non-recovery of waste from a site.
- n) Explain the importance of integrating recycled material whenever possible in construction onsite.
- o) List and outline renewable generation and how they impact circular economy.
- p) Outline the importance of circular economy on heat pumps (Geothermal air to water and water to water) and how they impact circular economy.

- q) Identify the CIBSE five circular economy scenarios.
- r) Describe the benefits and challenges in using locally sourced materials, extracted and produced close to the site
- s) Understand the importance of minimising the buildings energy demand using materials with good thermal properties.
- t) Understand the concept Design for Deconstruction (DfD) with adaptable independent layers.
- u) Understand the benefits of easily assembling, disassembling and replacing products and building elements.
- v) Identify and list tools that assist in the material and product selection for the construction process.
- w) Identify and outline relevant circular economy comparative assessment tools (relevant to materials and renewables).

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
6	WASTE AND RESOURCE MANAGEMENT		2.00	1.00	3.00
MODULE AIM					
The aim of this module is to provide the relevant knowledge required to minimise, reuse and repurpose waste through demolition, on and off site					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Understand the national regulations for Construction and Demolition Waste (CDWaste) on site.				
2	Identify and outline the risks associated with CDWaste.				
3	Outline the role of 'End-of-Waste' certification under EU regulations.				
4	Outline the circular supply chain: recovery and recycling.				
5	Outline the principles and steps involved in implementing a Resource and Waste Management Plan (RWMP) using case studies.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define waste management.
- b) Outline the EU regulations relevant to waste and contaminated soils for circular economy.
- c) Outline the national legislation relevant to waste management in construction.
- d) Outline the principles and hierarchy of waste management on the construction site.
- e) Outline a pre-demolition audit.
- f) Outline a pre-development audit.
- g) Outline how to select a demolition and CDWaste recovery plan using case studies.
- h) Outline the steps involved in implementing a resource and waste management plan (RWMP) on site.
- i) Describe the benefits and challenges in implementing a RWMP on site.
- j) Identify the main actors and responsibilities involved in RWMP pre-construction and during the construction phase.
- k) Outline the responsibilities of a resource manager.
- l) Outline the guidelines to design out waste prior to construction.
- m) Outline the infrastructure required on site to support the implementation the RWMP.
- n) Outline the safety measures in waste management in relation to national regulations.
- o) Define the properties of waste and its classification (reuse, recovery, repurpose, recycle, disposal etc).
- p) Outline the benefits and challenges of selective demolition, separation, recycling and recovery onsite and offsite.
- q) Identify and outline examples of what your organisation can do to reduce construction waste on site.
- r) Outline on-site compliance in the management, separation and recycling of CDWaste on site.

- s) Understand how a cost analysis is implemented when selecting a demolition, recycling and recovery plan.
- t) Outline the main standards applicable to landfills and their operation: basic facilities and processes.
- u) Outline what is waste traceability and how to monitor it on site.
- v) Outline the risks associated with CDWaste and the associated preventative mitigated measures.
- w) Identify hazardous materials (Uranium, radon, nano materials, asbestos) on site.
- x) Outline the typologies of hazardous and non-hazardous materials and substances
- y) Outline how to recover processes and set solutions for hazardous materials and substances.
- z) Identify the main actors and responsibilities involved in handling hazardous materials on site.
- aa) Outline prevention and protection measures to reduce the risks involved in handling hazardous materials.
- bb) Be aware that all construction workers require induction training on site on resource and waste management.

On completion of the training module learners will be able to:

KNOW HOW AND SKILLS:

- a) Be aware of the environmental conditions of the site and surrounding areas.
- b) Apply preventative and protective measures to avoid risks associated with CD waste.
- c) Carry out the loading and transport operations of waste in a safe deposit/landfill, complying with the regulations on waste management.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Be aware of the risks associated with waste management with respect to procedures, equipment and conditions of the site.
- b) Be aware on how to apply the waste management regulations on loading, unloading and transporting waste for reuse, recycling and repurpose.
- c) Be aware of the responsibility of each team member and work protocols on site.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
7	WATER MANAGEMENT		2.00	0.00	2.00

MODULE AIM

The aim of this module is to provide the basic relevant knowledge required to minimise and reuse water using a water management on the construction site.

MODULE OBJECTIVES

ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
1	The trainer will deliver the following key points for this module Outline the national regulations for water management in construction.
2	Identify and outline the risks associated with Water Management.
3	Outline the principles and steps involved in implementing a Water Management Plan, using case studies.
4	Understand the importance of Water Management on a construction site.

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define water management.
- b) Outline the national legislation relevant to water management (supply, groundwater, pollution and water waste).
- c) Outline why water conservation and reuse is an important commodity in construction.
- d) Outline the types of water management.
- e) Outline the principles and methods of water management in circular building construction.
- f) Identify the main actors and responsibilities involved in water management during the construction phase.
- g) Outline measures to reduce water use and consumption during the construction and operational phases.
- h) Describe the benefits and challenges in implementing a water management plan on site.
- i) Outline the steps involved in implementing a water management plan onsite.
- j) Outline the importance of surface water management and the associated preventative mitigated measures onsite.
- k) Outline the risks associated with groundwater pollution, surface water and water-waste on site.
- l) Apply preventative and protective mitigated measures to avoid/reduce risks associated with groundwater pollution, surface water and water-waste on site.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Be aware of the risks associated with water management with respect to procedures, equipment and conditions of the site.
- b) Be aware of the responsibility of each team member and work protocols on site.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
8	LEAN AND MODULAR CONSTRUCTION		1.00	0.00	1.00
MODULE AIM					
The aim of this module is to provide the basic knowledge to understand lean and modular construction and how these methods impact on the circular economy					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline the definition and principles for Lean construction.				
2	Outline how Lean Construction can reduce waste and use of natural resources.				
3	Outline the process of managing the Lean Construction capabilities for each stage of construction.				
4	Outline the definition and principles for modular construction/lean production.				
5	Outline how modular construction can reduce waste and the use of natural resources.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define Lean construction.
- b) Outline the national legislation relevant to Lean construction.
- c) Outline the main principles of Lean construction.
- d) Outline the benefits in implementing Lean construction relevant to circular economy.
- e) Explain how building materials are economically sourced and waste control is carefully monitored.
- f) Outline the 7 types of waste to consider in Lean construction.
- g) Outline the A3 Management Process for construction.
- h) Benefits of Lean in Procurement & Contractual Processes.
- i) Define modular construction and the key features of modular buildings construction.
- j) Explain the benefits and disadvantages of modular construction and other Modern Methods of Construction (MMC).
- k) Explain how the use of modular construction can support a circular construction and positive impact on waste reduction.
- l) Identify and outline best practice case studies for Lean and modular construction.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
9	LIFE CYCLE ASSESSMENT (LCA)		2.00	0.00	2.00
MODULE AIM					
The aim of this module is to provide the learner with the basic knowledge of Life Cycle Assessment (LCA) and how LCA can support circular construction.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Understand the principles of Life Cycle Assessment (LCA) using resource efficient and recycled materials.				
2	Outline the steps taken at each life cycle phase to ensure a circular construction process.				
3	Identify the methodology for LCA and how to apply them in construction projects.				
4	Identify and explain the role of LCA in achieving green building certifications (BREEAM, LEED etc.,)				
5	Identify the software and tools available for LCA.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define the principles of Life Cycle Assessment (LCA).
- b) Explain the terms and definitions associated with LCA.
- c) Explain the increasing importance of building LCA within the global construction industry.
- d) Outline how LCA assist in the transition towards a circular economy.
- e) Identify key impacts of LCA for workers in the field of construction.

- f) Identify and outline the purpose of LCA for workers relevant to a construction project.
- g) List the building life-cycle stages and their impacts on circular economy.
- h) List types of LCA tools available.
- i) Identify and outline how to access and use LCA national databases.
- j) Outline the importance of the Life cycle inventory.
- k) Outline why it is important to take a whole-life approach to calculating environmental impact.
- l) Outline the different types of LCA calculation in different project stages.
- m) Identify and explain the role of LCA in achieving green building certifications and circular buildings.
- n) Explain the purpose of an impact assessment and the tools that are available to support this.
- o) Outline the roles and responsibilities of various stakeholders in decarbonizing the built environment (e.g., designers, builders and product manufacturers).
- p) Identify and outline how the use of Level(s) in circular assessment can benefit construction workers.
- q) Outline the macro-objectives in the Level(s) common framework.
- r) Outline the benefits of using EU Level(s) for construction projects.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
10	LIFE CYCLE COSTING		2.00	0.00	2.00
MODULE AIM					
The aim of this module is to provide the learner with the basic knowledge of Life Cycle Costing (LCC), and the benefits of its use to support circular economy.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline the role of LCC in circular economy in construction.				
2	Identify and define the principles and benefits of Life Cycle Costing (LCC).				
3	Identify and outline the software and tools for LCC.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Outline the principles of LCC and when they can be applied.
- b) Outline the social impact of using the LCC process in the built environment.
- c) Outline how LCC assist in the transition towards a circular economy.
- d) Identify and list the tools that are available for LCC nationally and at EU level.
- e) Outline LCC standards, tools and databases.
- f) Identify and list the phases of LCC, (The Product Stage, Construction Stage, Use Stage and End-of-life Stage).
- g) Outline how each phase collaboratively supports circular construction.
- h) Identify types of good/services which allows the environmental costs of purchases can be evaluated.
- i) Outline the relevance of Directive 2014/24/EU to award contracts in EU Public procurement framework.
- j) Outline the role of LCC in green public procurement and construction projects.
- k) Identify the costs over the life cycle of a product, service and work relevant to construction.
- l) Outline how LCC can evaluate the total cost or real cost of goods, services and works in construction.
- m) Demonstrate how LCC can be applied at project cost estimation stage, during the offer evaluation and as part of contract monitoring using case studies

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
11	COLLABORATION AND COMMUNICATIONS		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the relevant knowledge and skills required to understand the roles and importance of working together onsite and communicating effectively on the construction site.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Understand the importance of working together onsite as a team to achieve circular buildings.				
2	Outline the important contributions of all construction workers to achieve circular buildings.				
3	Demonstrate how poor workmanship and choice can impact circularity on site.				
4	Outline how CE commitments and targets set out by the client can filter down to site workers.				
5	Demonstrate how effective communication tools can support circular best practice.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Demonstrate collaborative teamwork and “system thinking” on-site with all trades.
- b) Outline the importance of cross craft working with reference to circular economy.
- c) Explain the importance of ensuring good communication between all trades on the site as part of an overall ‘system-thinking’ approach to circular construction.
- d) Outline how good communication between all trades can be implemented to support circular construction.
- e) List key aspects that require excellent communication on-site, during the construction phase.
- f) Outline the importance of the effective circular management on site.
- g) Understand that discussions will be required with the foreman/supervisor before works start to outline the circular strategy for the building.
- h) Outline how all building construction workers have a contribution to make to achieve a circular building.
- i) Outline what role you will play in delivering the circular strategy, including recognising when specialist external expertise might be required.
- j) Identify circular choices made on site at demolition phase.
- k) Understand what choices will be required in reusing, repurposing and recycling materials by discussing with foreman/supervisor and other disciplines.
- l) Describe the consequences of other trades adversely impacting the circular strategy.
- m) Understand which circular materials are specified and checking the correct materials have been received.
- n) Understand where circular materials are being used and how they are identified and certified.
- o) Outline how different people at different times are responsible for executing and managing certain aspects or elements of circular construction.
- p) Outline how to translate planning requirements, client commitment and targets throughout the phases and what communication tools can support best practice.
- q) Outline the required circular information (products, agreements, materials) for the maintenance/operational information handbook.
- r) Describe what information needs to be provided to the building owner to ensure that the building is operated and maintained to its optimum, with special emphasis on circular economy.
- s) Describe what information needs to be provided to the building owner in relation to how best to integrate future alterations and / or additions to the circular building.

- t) Describe the importance of installing and detailing specific products regards to maintaining, reusing and replacing products and materials in the future.
- u) Explain the importance of continuing professional development CPD (continuous training) in relation to circular skills in construction.
- v) Understand where CPD and future accredited trainings can be obtained in relation to circular construction.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
12	GREEN PUBLIC PROCUREMENT- OVERVIEW		2.00	0.00	2.00
MODULE AIM					
The aim of this module is to demonstrate the role which public procurement can play in supporting the transition towards a circular economy in construction.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Define and outline the principles of EU Green Public Procurement (GPP).				
2	List and outline the benefits and opportunities of Green Public Procurement (competitiveness, social responsibility, reputation etc.,) for circular construction.				
3	Outline the scope to follow a circular procurement strategy in construction.				
4	List the steps in the circular procurement process (pre to post procurement).				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define circular procurement.
- b) Define and outline the principles for EU GPP.
- c) Outline the national GPP requirements.
- d) Identify the different levels of GPP policy (general commitment, commitment within related policy, comprehensive GPP policy).
- e) Identify and outline the LCC method to be applied from tenderers in the procurement documents.
- f) Outline the use of LCC at award criteria during the tendering process.
- g) Demonstrate how LCC can be included in award criteria using a case study.
- h) Explain why GPP implementation is beneficial for use in construction.
- i) Explain why GPP implementation is beneficial for your organisation.
- j) Discuss how GPP can support circular economy.
- k) Outline the impact public procurement can have on delivering the circular economy.
- l) Outline the importance of setting a scope and targets for successful GPP.
- m) Identify and outline what should be considered in implementing a GPP strategy in an organisation (actions, communication, monitoring, reviewing).
- n) Outline the steps which are required to put a GPP implementation strategy in place.
- o) Identify best practice of GPP implementation in construction.
- p) Discuss a case for implementing GPP within an organisation.
- q) Discuss the opportunities for circular procurement throughout the procurement cycle.
- r) Discuss how you would gather support for GPP within an organisation.
- s) Identify where to go for further information on GPP.

On completion of the training module learners will be able to:

COMPETENCE AND RESPONSIBILITY:

- a) Specify the opportunities for circular procurement in construction.
- b) Determine high potential product groups relevant to construction for circular procurement.
- c) Explain ownership model vs usership model for circular economy.
- d) Compare key environmental impacts with a GPP approach in construction.
- e) Demonstrate competency in following a strategy for implementing GPP within an organization.
- f) Demonstrate competency in identifying opportunities for circular procurement.
- g) Demonstrate a willingness to present personal views on the topics presented and participate in discussions.
- h) Show sensitivity towards individual differences and opinions.
- i) Apply critical and problem-solving skills.
- j) Demonstrate the ability to collaborate in a team and transfer information effectively.
- k) Demonstrate responsibility for evaluating and following best practices.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
13	CERTIFICATION IN CONSTRUCTION		1.00	0.00	1.00
MODULE AIM					
The aim of this module is to provide the learner with the knowledge to understand the role of EPDs and product transparency in supporting the transition to a circular economy.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Outline the role of certification in GPP and Circular Economy.				
2	Outline how Environmental Product Declarations (EPDs) are produced.				
3	Outline the EU Product Environmental Footprint (PEF).				
v	Outline the role of certification and identify examples of the types of eco labels and green certification labels used in construction.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Define Environmental Product Declarations, (EPDs) and what they measure.
- b) Outline the benefits of EPDs for your construction organisation.
- c) Outline when EPDs should be used.
- d) Outline the role of environmental certification in circular construction.
- e) Outline the role of environmental certification in GPP.
- f) Roles in responsible sourcing in circular construction.
- g) Outline the development of an EPD for each stage using case studies.
- h) Outline the EU Product Environmental Footprint (PEF).
- i) Outline the purpose of the Product Environmental Footprint (PEF) for construction.
- j) Identify examples of the types of eco labels and green certification labels used in construction.
- k) Identify the tools and platforms that can be used for developing and publishing EPDs.
- l) Outline how ecolabels benefit a circular building.
- m) Outline the EU Ecolabel criteria for a construction product.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
14	USING BUILDING CIRCULARITY TOOLS		1.00	2.00	3.00
MODULE AIM					
The aim of this module is to provide the basic knowledge to understand importance of the circularity tools and the introduction on how to use the tools for building circularity.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Identify and outline the standard for calculating building level Life Cycle Assessment (LCA) -EN 15978.				
2	Introduction to the functionality of the circularity tools (LCA, LCC, Level(s) etc) for building Life Cycle Costs and Assessments.				
3	Outline how to choose material sources, design out waste and measure circularity, using case studies.				
4	Outline how to quantify and compare the impacts of your different design choices with the building circularity scores using case studies.				
5	Outline how to conduct a structured cost analysis, define major expenditure sources, identify priority areas to improve the baseline design and compare impacts of design alternatives.				

On completion of the training module learners will be able to:

KNOWLEDGE:

- a) Outline the role of LCA in GPP and the rules that apply under procurement law.
- b) Identify the methodology for LCA and how to apply them in construction projects.
- c) Outline how LCA data can be used in a project.
- d) Outline the relationship between product LCA data and building LCA data.
- e) Demonstrate the estimation of environmental savings.
- f) Investigate material selection with LCA method at construction phase.
- g) Explain the purpose of an impact assessment and the tools that are available to support this.
- h) Outline the roles and responsibilities of various stakeholders in decarbonizing the built environment (e.g., designers, builders and product manufacturers).
- i) Define the Goal and Scope of a LCA case study (ISO 14041).
- j) Outline how to make a model of the product life cycle, referred to as Inventory analysis.
- k) Identify the environmental relevance of Life Cycle Impact Assessment (ISO 14042).
- l) Outline issues such as the circular economy (maintaining the value of materials and products in the economy for as long as possible, reducing resource use and preventing waste), land use, biodiversity, and air, water and soil pollution.
- m) Identify the 6 Level(s) macro-objectives and the indicators that support each one.
- n) Outline financial and environmental savings using case studies. (not just the up-front purchase costs of a given solution, but its total economic and environmental cost from cradle to grave or cradle to cradle).
- o) Outline how LCC is used to identify costs of a product, service and construction work.
- p) Identify the data criteria required using the LCC methods (objectively verifiable, non-discriminatory, accessible, data can be required with reasonable effort, transparency).
- q) Demonstrate how LCC can be included in award criteria using a case study.
- r) Outline the benefits and functionality of the Level(s) calculator tool for site managers and construction workers.
- s) Understand the 6 Level(s) macro-objectives and the indicators that support each one.
- t) Outline the different user groups for construction contractors.
- u) Establish to which 'level' project performance will be assessed for the building project.
- v) Decide which objectives (and therefore indicators) will be involved from the beginning of a project.
- w) Demonstrate how to complete a circularity assessment using Level(s) over the life cycle of a building project.

DIGITALISATION

Digitalisation in Construction

TRAINING AIM

The aim of the programme is to increase the learners' knowledge of digital tools, techniques and practices applied to the construction sector.

PROGRAMME OBJECTIVES

SEQUENCE NUMBER	ACTIVITY STATEMENT
1	On completion of the training programme learners will be able to List and describe the key policy and legislative drivers, relevant to digitalisation in the construction industry.
2	Identify the need and benefits of digitalisation for the construction industry.
3	List and describe the key digital tools, techniques and practices used to support the construction of quality buildings.
4	Identify best practice of a number of construction methods and details using digital tools and techniques to achieve quality buildings.
5	Identify best practice of a number of service methods and installations using digital tools, techniques and technologies to achieve quality buildings.
6	Understand how to communicate with other trades using collaborative digital tools and techniques to achieve quality buildings.
7	Understand how to apply digital problem-solving workflows and solutions on site.

OUTLINE TRAINING PLAN LIST OF MODULES

MODULE NUMBER	DESCRIPTOR	Duration Hours
1	Introduction	1.00
2	European & National Drive EU Digitalisation Policies National Digitalisation	1.00
3	Introduction to Digital Tools Communication Tools Collaborative Tools	1.00
4	Introduction to Digital Technologies On site Technologies Off-site Technologies	1.00
5	Data Protection Cyber Security Digital Data management and storage	1.00
6	Introduction to BIM BIM Fundamentals BIM Principles BIM Uses and Software	2.00
7	BIM Uses in Construction BIM Objects Maturity levels Use of BIM in each Phase	3.00

MODULE NUMBER	DESCRIPTOR	Duration Hours
8	BIM and Collaboration Accessing info through the cloud Accessing info with mobile devices (apps, QR etc) BIM review and problem solving Quantification and Clash Detection	3.00
Roles and Knowledge Transfer		
9	Roles BIM and file structure Digital Workflows System thinking	3.00
Introduction to Quality Checks		
10	Quality Control and Checks Building Compliance	3.00
Quality Checks on Site		
11	Building Fabric Checks Building Services Checks	3.00
Automation and Artificial Intelligence		
12	Automation Artificial Intelligence and 3D Printing Wearables and Extended Reality Smart Controls	1.00
Construction 2030		
13	Quantum Computing and Blockchain Digital in the Future Future Choices	1.00
Tools for Energy Efficiency		
14	Energy Efficiency Tools Energy Simulation Tools	2.00
Tools for Circular Economy		
15	Sustainable Construction BIM checks for LCA BIM checks for LCC	2.00
Introduction to Digital Passports		
16	Digital Logbooks Digital Building Passports Digital Renovation Building Passports	2.00
Total Duration of Modules		30 hours (4 days)

Academic hours	1-2 hours lecture + 1-2 hours practical lessons per week Total: 60 hours - 24 hrs lectures and 36 hrs practical lessons/study (based on chosen modules)
Type of discipline	e-learning tools, facilities for practical demonstration and training, and assessment/examination procedures
EQF level	4 - 5
Preliminary requirements	The students are expected to have some general knowledge on building physics & building materials, building construction basics.
Assessment procedure	Assessment and final written exam (incl. drawings done on site) and option of an oral examination.
Technical secure (hardware and software)	White board Multimedia facility Demonstration models Practical training models Samples of components and materials Samples of relevant software Demonstration videos
Lectures	Online facility Classroom facility Expert guest speakers
Resources	Moodle platform (or equivalent) Induction pack: structure of programme, registration info, introduction to programme, helpdesk details and forum) Learning resources: reading resources, videos, materials, etc.

OUTLINE TRAINING PLAN MODULAR BREAKDOWN OF TRAINING

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
1	INTRODUCTION		1.00	0.00	1.00
MODULE AIM					
State the planned outcomes and the conditions attached to the attendance on the course; apply good safety, health and hygiene practices; understand the rules of the centre and explain the meaning of equal opportunities.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
The trainer will deliver the following key points for this module					
1	State the aim and outline the objectives of the training programme, the certification that is available and get to know fellow learners				
2	Identify different learning styles and delivery used for the training and outline the structure and indicative programme of the training.				
3	State the role and functions of the training centre/VET provider.				
4	Conform to the rules and regulations of the training location.				
5	Observer safe practices in the workplace (H&S).				
6	State the supports available to learners (if required).				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
2	EUROPEAN & NATIONAL DRIVE		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the relevant knowledge and skills required to list and describe the key policy and legislative drivers for digitalisation relevant to construction and workers.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
The trainer will deliver the following key points for this module					
1	Identify and outline the key terms and definitions associated with digitalisation.				
2	Outline the key principles and drivers for digitalisation (including smart cities, smart economy) related to construction.				
3	List and outline how digitalisation can support the agenda for climate change and support energy efficient sustainable construction at EU level.				
4	List and outline how digitalisation can support the agenda for climate change and support energy efficient sustainable construction at National level.				
5	Understand how to keep up-to-date with changes and amendments to digital policies and initiatives at European and National levels relevant to construction.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
3	Introduction to Digital Tools		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the relevant knowledge and skills required to access and use digital tools and mobile Apps to communicate and collaborate effectively with others to support construction					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Understand the importance of effective communication and collaboration.				
2	Outline the use of cloud-based storage to access and exchange information.				
3	List and outline the benefits of digital communication tools suitable for the laptop and mobile App.				
4	Demonstrate using digital devices (online and portable), how to access, review and use files to exchange information.				
5	List and outline digital collaborative tools suitable for the purposes of construction.				
6	Demonstrate using digital devices (online and portable), how to access, use and review files, transfer data and store files.				
7	Identify and list other collaborative digital tools used for information and knowledge transfer and storage for the purposes of construction. (BIM, Construction Apps, etc.).				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
4	Introduction to Digital Technologies		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand the benefits and where to use digital technologies relevant to construction.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Identify and list digitalised technologies suitable for the purposes of construction.				
2	Identify and define digital technologies used on the site.				
3	Identify and define digital technologies used off the site.				
4	Outline where digitalised technologies are used for the purposes of construction.				
5	Outline and discuss the benefits and opportunities of the digitalised technologies for each of the phases of construction.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
5	Data Protection		1.00	0.00	1.00
MODULE AIM					
To equip the learner with the basic knowledge required to understand how to use and store digital data to ensure data protection and security, when communicating with others					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline the importance of digital data protection, security and storage of information (GDPR).				
2	Outline the importance of effective data management during the BIM process.				
3	List the types of data associated with BIM models (Graphical, non-graphical, documents) and give examples.				
4	Outline the importance of establishing who is responsible for BIM model data.				
5	Outline the requirements of a CDE system in terms of data protection (licenses for access, secure login system, security requirements, recording, model viewer, audit trail, approval workflow).				
6	Outline the process of workflow approval (Work in Progress, Shared, Published, Archive stages).				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
6	Introduction to BIM		2.00	0.00	2.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand the role of Building Information Modelling, (BIM) as part of the digitalisation of the construction industry.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline the background to Building Information Modelling, BIM.				
2	Define the methodology and principles of BIM.				
3	Outline why BIM is important for the construction industry.				
4	List and outline the BIM Dimensions (2D-7D).				
5	List and outline the BIM Maturity Stages and their significance in the move towards a digital construction sector.				
6	List and outline the software and tools that can be used in the BIM process.				
7	Identify and outline BIM-viewers to be used for collaboration in the construction industry.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
7	BIM Uses in Construction		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the relevant knowledge required to understand how a BIM model data can carry out costings, verify materials and quantity and coordinate the construction work					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Outline how the separate disciplines or models can be brought together or “federated” in a BIM Viewer.				
2	Demonstrate how to navigate import/export data and save NWC files.				
3	Outline how to create a federated model, navigate viewpoint, review and select functions and importance of clash detection.				
4	Demonstrate how to create a federated model and navigate the viewpoint, review, select and clash detection functions.				
5	Outline and understand the importance of the functions time-liner and quantification.				
6	Demonstrate simply how to navigate the time-liner and quantification functions using demonstration model.				
7	Outline the use of BIM objects for each phase of the construction process (preconstruction, construction and post construction).				
8	Outline BIM model uses for coordination, design review, clash detection, specification, costing, quantification and energy analysis.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
8	BIM and Collaboration		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the relevant knowledge and skills required to understand and know how to use data in a collaborative digital workflow between all construction team members.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module				
	Outline the importance of BIM collaboration at each stage of construction.				
2	Outline the benefits of a digital collaborative workflow between all construction team members.				
3	Outline the principles and use of the Common Data Environment, CDE for storing digital data to support collaboration in construction.				
4	List and outline how digital tools can support the principles of <i>system thinking</i> between teams on site.				
5	Demonstrate how communication between the construction team members is carried out on site using digital tools to create a problem-solving workflow.				
6	Outline how to access and evaluate a BIM model using digital design review tools to support collaboration between the design, construction, operation and maintenance teams.				
7	Demonstrate simply how to access and evaluate a BIM model using digital design review tools for the construction and maintenance phases using case studies.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
9	Roles and Knowledge Transfer		1.00	2.00	3.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand roles and how information is managed during the BIM process and digitally transferred on completion of works.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Outline the importance of collating accurate digital information and knowledge transfer between the design, construction and maintenance teams.				
2	Outline the importance of digital knowledge transfer to the building owners and occupants.				
3	Outline and understand the roles of each member of the construction team during construction when using the BIM model.				
4	Identify and outline good practice steps to transfer knowledge using digital tools during each phase of construction.				
5	Demonstrate the extraction and inclusion of information from models for the purposes of checking the design, details and construction work.				
6	Identify and outline good practice steps to transfer knowledge using digital tools at completion of the construction works and for the future life of the building.				
7	Outline the importance and benefits of having accurate digital building information at handover stage.				
8	Demonstrate how knowledge is transferred using digital tools at completion of the construction works.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
10	Introduction to Quality Checks		1.00	1.00	3.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand and know how digital tools can be used to support quality and compliance in construction.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
1	The trainer will deliver the following key points for this module Define quality assurance in the construction of buildings.				
2	Outline how the project team can be coordinated to ensure quality control on-site.				
3	Outline and demonstrate how to use digital tools to comply with national regulations for the building design, construction, operation and maintenance.				
4	Discuss the use of the BIM methodology as a tool to support quality and compliance.				
5	Demonstrate with an example, the benefits of using digital tools for quality checks.				

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
11	Quality Checks on Site		1.00	2.00	3.00

MODULE AIM

To equip the learner with the relevant knowledge and skills required to understand and know how digital tools can support the quality checks of the installation and detailing of building materials, products and equipment.

MODULE OBJECTIVES

ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
	The trainer will deliver the following key points for this module
1	List and outline different quality controls for the building fabric.
2	Outline how digital tools can assist in building fabric checks on site (such as heat loss, air tightness, thermal bridging, glazing etc.).
3	Outline and discuss good and bad examples using case studies.
4	Demonstrate an air tightness quality check using digital tools in collaboration with other team members.
5	List and outline different quality controls for the building services.
6	Outline how digital tools can assist in building service checks on site (such as ventilation, heating and cooling, lighting and smart controls etc.).
7	Outline and discuss good and bad examples using case studies.
8	Outline how digital tools can assist in monitoring the operation and maintenance of building services.
9	Demonstrate a ventilation check quality check using digital tools in collaboration with other team members.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
12	Automation and Artificial Intelligence		1.00	0.00	1.00
MODULE AIM					

To equip the learner with the relevant knowledge required to understand the use of new technologies such as automation, artificial intelligence and extended reality for the construction industry.

MODULE OBJECTIVES	
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
1	The trainer will deliver the following key points for this module Outline the principles and benefits of automation in construction for Health & Safety, cost and time management and communication (drones, 3D printing, robotics).
2	Discuss the use of technologies, robotics and drones, and outline how the digital information and data can be transferred for construction.
3	Outline the benefits and opportunities of extended reality for Health & Safety, cost and time management, communication and training (VR, AR, laser scanning, MR).
4	Discuss the uses of Artificial Intelligence (AI), VR and AR, and outline how the digital information and data can be transferred and used for construction.
5	Outline the principles and benefits of Modular Construction.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
14	Tools for Energy Efficiency		1.00	1.00	2.00
MODULE AIM					

To equip the learner with the basic knowledge and skills required to understand and know how BIM and other digital tools can improve the energy performance of buildings.

MODULE OBJECTIVES	
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS
1	The trainer will deliver the following key points for this module List and outline how the use of digital tools can improve the energy efficiency of buildings.
2	Outline how a BIM model can be used to perform an energy analysis.
3	Outline how to develop a Building Energy Model (BEM).
4	Demonstrate how to develop a Building Energy Model (BEM) using a case study.
5	v
6	Outline the process of delivering a BEM to an energy simulation tool.

SEQUENCE NUMBER	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
15	Tools for Circular Economy		1.00	1.00	2.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand and know how digital tools and models can support the reduction of the environmental impact of buildings.					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Identify existing BIM and Digital tools on the market used to assist with sustainable and healthy construction.				
2	Outline how BIM use in the construction industry, can help to contribute towards reducing waste, carbon emissions and produce more energy efficient building stock.				
3	Identify and outline the implications and benefits of using BIM and other digital tools to construct and renovate sustainable healthy buildings.				
4	Identify and outline how BIM can support Life Cycle Assessment (LCA) of buildings to calculate their overall environmental impact.				
5	Identify and outline how BIM can support the Life Cycle Costing (LCC) of buildings to calculate the cost over the building's entire life cycle.				
6	Demonstrate using BIM and digital tools, an outline of a strategy on how to achieve low-risk, high-impact sustainable healthy renovation works using suitable materials and products.				

v	MODULE TITLE	LEVEL	DURATION IN HOURS		
			DIRECTED	WORKPLACE	TOTAL
16	Introduction to Digital Passports		1.00	1.00	2.00
MODULE AIM					
To equip the learner with the basic knowledge and skills required to understand and know the principles of Digital Passports and how they can benefit the Renovation of buildings					
MODULE OBJECTIVES					
ACTIVITY SEQUENCE	ACTIVITY STATEMENTS				
	The trainer will deliver the following key points for this module				
1	Identify and outline the key terms and definitions associated with digital passports for buildings.				
2	Outline the key drivers and opportunities for digital passports.				
3	Identify and outline the social and economic benefits of digital passports.				
4	Outline the principles of the Digital Building Passport and Digital Logbooks.				
5	Understand what relevant data and information should be transferred into the Digital Building Passports.				
6	Outline the principles of the Digital Building Renovation Passport.				
7	Demonstrate what relevant data and information should be transferred for the Digital Building Renovation Passports.				

