



awakening | relevant | innovative | scalable | equitable

D3.4 Map of available resources linked to the developed qualification framework

Issue Date

18th April 2023

Version: V01



D3.4 Map of available resources linked to the developed qualification framework

Lead partner	TU Dublin
Issue Date	18.04.2023
Produced by	TU Dublin
Main author	Ryan Dempsey
Co-authors	Dr Barry McAuley, Jaap Kolk
Version	V.01
Reviewed by	Dr Barry McAuley
Approved by	Jan Cromwijk
Dissemination level	Public

Copyright © 2021 by ARISE consortium

Use of any knowledge, information or data contained in this document shall be at the user's sole risk. Neither the ARISE Consortium nor any of its members, their officers, employees, or agents shall be liable or responsible, in negligence or otherwise, for any loss, damage or expense whatever sustained by any person as a result of the use, in any manner or form, of any knowledge, information or data contained in this document, or due to any inaccuracy, omission or error therein contained. If you notice information in this publication that you believe should be corrected or updated, please get in contact with the project coordinator.

The authors intended not to use any copyrighted material for the publication or, if not possible, to indicate the copyright of the respective object. The copyright for any material created by the authors is reserved. Any duplication or use of objects such as diagrams, sounds, or texts in other electronic or printed publications is not permitted without the author's agreement.



Publishable executive summary

This report demonstrates the mapping process of currently available resources to the developed qualification framework. The recommendations for the selection of learning material are built on the work carried out by partner BIM-EPA projects. The modules are aimed at meeting the requirements for BIM and sustainability learning content. The format of the report includes a summary of the selection of learning material and an update to further additions to resources. The linking and mapping of resources to the qualification framework are also presented, giving an example of where this has been demonstrated.

The main objectives of this report were:

1. to review learning content available from the BIM-EPA projects and put forward the material that best suited the ARISE project
2. To identify and select learning content that will be used in the project's communication and program testing activities, resulting in several professionals across Europe, with increased capacity in sustainable energy and digital skills, with induced potential to initiate and generate energy savings, clean energy application and investments in sustainable energy in building projects,
3. to map the available resources to the developed qualification framework



Contents

1. Introduction.....	6
2. Summary of the Deliverable 5.2 - Selection Of Pilot Material	6
2.1 Update on Learning Material	7
3 Mapping to Qualification Framework	11
4. Conclusion and Future Work.....	14



Glossary

BIM – Building Information Modelling

BIM-EPA – BIM for Energy Performance Alliance

PBL – Project-Based Learning

DFD – Design for Disassembly

GSL – Guided Self Learning

ULO – Unit of Learning Outcome

QF – Qualification Framework



1. Introduction

This report presents the mapping of available resources linked to the published qualification framework found in Deliverable 3.3. Previously published reports in WP5 suggested recommendations for the definition of learning, methodologies, materials and delivery tools for the ARISE platform (D5.1). Further to this, the published report containing the selection of learning material has been recommended as part of *Deliverable 5.2 – Selection of Pilot Material*. The learning modules presented in this document give an overview of the current suite of resources available to adopt from the BIM-EPA projects – BIMCert, BIMzeED, and NetUBIEP. Combining the work carried out in previous deliverables, this document sets out how the proposed materials will be mapped against the qualification framework as the project prepares for the trialling stages.

2. Summary of the Deliverable 5.2 - Selection Of Pilot Material

The ARISE Consortium chose a selection of material that would best have the potential to impact significant numbers of construction market participants and stakeholders, from the demand side (investors, employers, owners, public administration), to the supply side (professionals, construction contractors, white and blue-collar construction workers) across Europe. A selection of learning outcomes from training units discussed in section 2 was chosen for material development *as they could be delivered through instructor-led live lectures which would enable the opportunity for the lecturer/trainer to engage with the class*. It was also the intention to develop material that could be used for GSL, to gain an insight into how potential users would interact with this material. The developed material will be initially hosted on the ARISE website (<https://www.ariseproject.eu/>) while the primary platform is being produced/finalised.

From the exercise in developing the ULOs of the Qualification Framework, the existing BIMCert learning modules were mapped back to the list of learning outcomes that were written in Deliverable 3.3. The previous 19 modules from BIMCert have been narrowed down to 13, and have been organised into the BIM Specialism that is deemed most suitable (Figure 1).

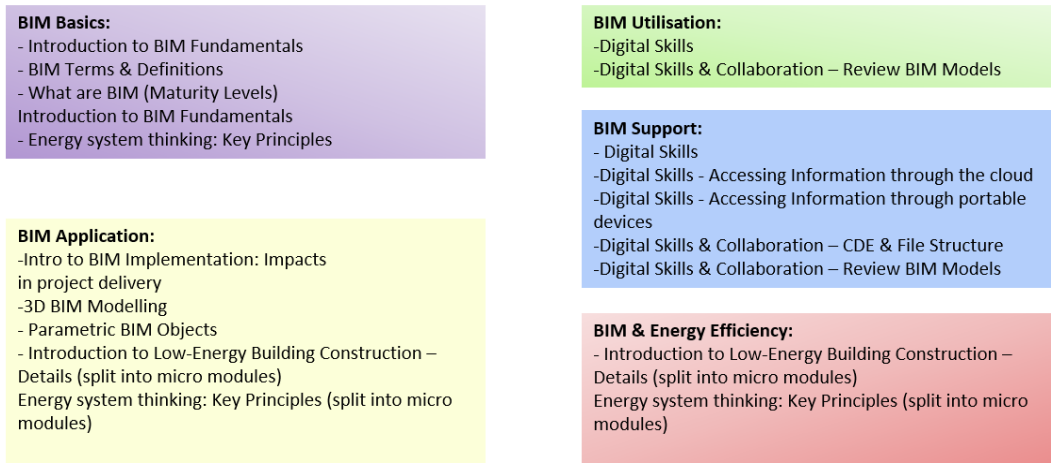


Figure 1- BIMCert Modules aligned to ARISE BIM Specialisms

An additional criterion applied in selection was to achieve balance in upskilling applicable in new and renovated projects. It is to be noted that the modules from the BIMCert project will require a thorough process of revising and updating to suit the ARISE platform. Any comments or recommendations have been marked in a table format next to the available resources. What is deemed suitable for the ARISE trials, will be prioritised in the preparation of learning content. The following modules have been recommended for the selection of learning material:

- Introduction to BIM Fundamentals
- BIM Terms & Definitions
- What are BIM (Maturity Levels)
- Energy system thinking - Key principles (divided into micro modules)
- Intro to BIM implementation: Impacts
- 3D BIM Modelling
- Parametric BIM Objects
- Introduction to Low Energy Building Construction – Details (divided into micro modules)
- Digital Skills
- Digital Skills – Accessing Information through the cloud
- Digital Skills – Accessing Information through portable devices
- Digital Skills & Collaboration – CDE & File Structure
- Digital Skills & Collaboration – Review BIM Models
-

2.1 Update on Learning Material

Since the upload of Deliverable 5.2, additional learning units from ARISE from the BIMzeED project have been supplied by our partners. BIMzeED is a fellow BIM-EPA project that has developed a training program focusing on the area of BIM and nZEB. The project consortium comprised of industry experts and academics from Ireland, Spain, Croatia, and Hungary. BIMzeED's main goal was to introduce



additional learning materials into existing accredited construction programmes or to create new modules/courses focused on BIM & nZEB. To achieve this goal, a framework of twelve multidisciplinary learning modules with learning unit descriptors was developed to increase the understanding and skills of digital tools achieving nearly zero energy buildings. The e-learning platform, with learning plans for specific professional profiles, capitalises on the opportunities environmental protection can offer the construction industry (O'Brien et al., 2021). This contribution from BIMzeED is an enormous addition to the ARISE platform as we focus on leveraging energy & sustainability skills. The 12 modules consist of the following:

- LU1 – Collaborative BIM to achieve Nzeb
- LU2 – BIM and Nzeb for Workers
- LU3 – Nzeb Realisation and commissioning: Building Envelope and Air Tightness
- LU4 – Nzeb Realisation and commissioning: Building Services and Smart Technologies
- LU5 – Nzeb Realisation and commissioning: Quality Assurance
- LU6 – BIM Model Uses – during construction
- LU7 – BIM Model Uses – for specification and qualification
- LU8 – BIM Model Standardisation for Nzeb Design
- LU9 – Building Energy Modelling (BEM) Design and Export
- LU10 – Energy Simulation with BIM Tools
- LU11 – Nearly Zero Energy Building Facility Management
- LU12 – BIM in Facility Management Software (CMMS)

For the trial stages, it has been recommended by the partners to prioritise modules LU1, LU4 & LU11. These will be used for the target group of public and private investors and will be followed by a post-training survey including the question of their willingness to apply this acquired knowledge in starting new or renovation projects of NZEBs of at least 1000 m² each. Another recommendation is to keep the material from BIMzeED in its original format, rather than updating it for an ARISE template. It is hoped that providing a link to the original content by hosting on the ARISE platform, will encourage other projects to do the same, thus expanding on the material on offer for users. Additionally, the BIMzeED learning outcomes have been already mapped as part of Deliverable 3.1 along with BIMCert.

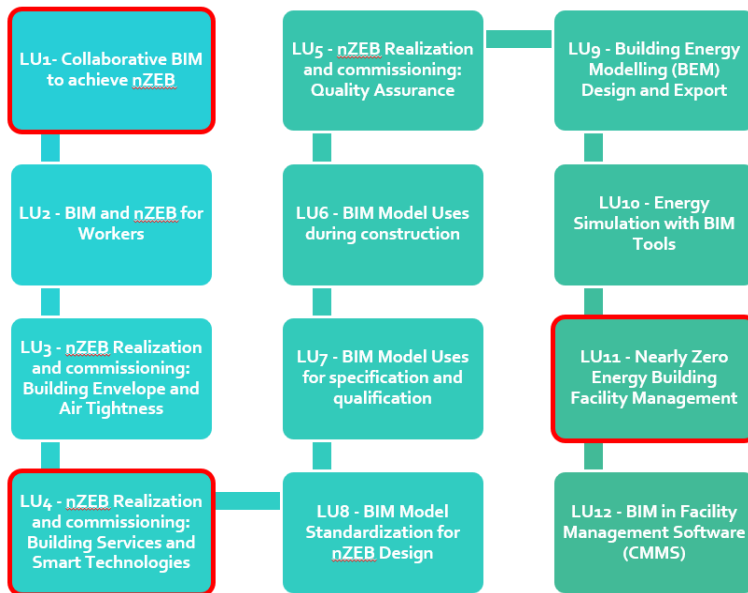


Figure 2- BIMzeED Modules highlighted for use in trial

Further to the BIMCert and BIMzeED learning material, the following content has been suggested for inclusion to map to the qualification framework. This material is originally from the netUBIEP project and focuses on the training of BIM technicians.

Module 0 Basic BIM knowledge and skills

Advantages and value of using BIM for different uses

Open BIM tools and standard format

The CDE

Module 1 – Diffuse BIM

Return on investment

Module 2 – Apply information management

Principle of data management in the CDE

The identification of non-graphic information for the BIM Model

The maintenance plan in EPC (Energy Performance Contracting)

Module 3 – Apply procurement management



Selection of materials and products with BIM Training on Energy Efficiency

The identification and collaboration among stakeholders

Module 4 – Use BIM technology

Sustainable construction sector

Laser scanning technology

Module 5 – Analyse the BIM Model

Simulation techniques and energy and lighting analysis

BIM for handover and maintenance

Training on Energy efficiency

Similar to the BIMCert modules that have been reviewed ahead of the trials, the BIMzeED materials will also require an appraisal. The selection of materials is of strategic importance, as content should be selected with learners directed towards the modules. In total, there are 31 learning modules available from both BIMCert, BIMzeED, and netUBIEP (Figure 3). An example of how the modules are presented on the ARISE platform is demonstrated in Figure 4.



Figure 3- Summary of the current suite of learning modules available for ARISE



3 Mapping to Qualification Framework

The development of the curriculum and associated materials for the ARISE platform will include a revision and updating of BIMCert materials, and now links provided to BIMzeED and netUBIEP materials, as noted in the previous section. This process has also been paralleled in the qualification framework with the updating of learning outcomes for these modules to align with the ARISE project.

While learning outcomes are developed for these training units, it is not the intention of the ARISE consortium to develop them any further during this iteration of the Horizon 2020 project. Each unit within a course represents a specific Unit of Learning Outcome. This ULO will be offered as an individual micro-size training option, to ensure that ARISE can attract learners who require specific areas of knowledge but do not have the time to complete a standard unit consisting of a series of learning outcomes. After completion of all units associated with the course, the learner will receive a higher award. The learner can take advanced units once they finish the relevant course units, i.e., Advanced BIM & Energy Efficiency. The range of units can be expanded or adjusted in the next stage of the ARISE project in response to market needs as well as to technological progress and regulatory requirements in the field.

The ULOs created from the Qualification Framework will be used as a foundation for the learning content created in Work Package 5. As the learning outcomes differ concerning the skills maturity, learning content will be developed to suit.

To keep the language and terminology consistent across all of the ULOs, the existing learning outcomes have been translated and rewritten as per the TRAIN4SUSTAIN verb terminology as noted in Deliverable 3.3. The learning outcomes outlined in the selected modules have been linked back and mapped to the tasks and subtasks that were identified in Deliverable 3.2.

A draft of the upskilling pathway has been developed to show the progression of a particular profession (Architect) and their learning journey as one takes on the modules and learning content which is underpinned by the Qualification Framework (Figure 5). This high-level concept focuses on the BIM Management specialism and demonstrates how the task 'Implement BIM strategy' and subsequent subtasks relate to a user's journey, what they will learn, skills maturity level and how they are linked to the digital badges of WP4. The Qualification Framework from there will be the foundation for how the learning content of ARISE is linked to the ULOs.

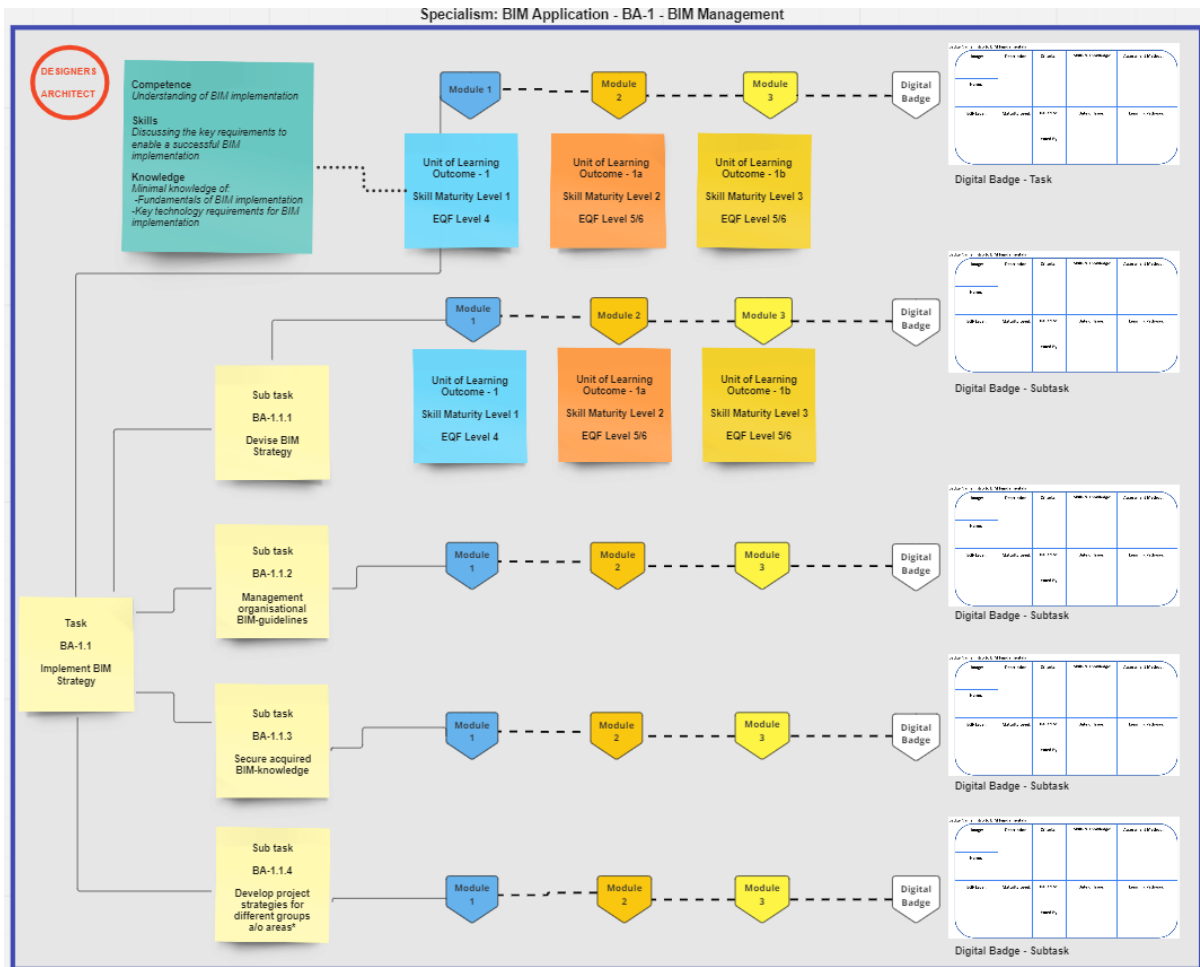


Figure 5. Concept of upskilling pathway for an Architect completing the 'Implement BIM Strategy' task and subsequent sub-tasks.

In the previous section, the process of reviewing the available resources was discussed. Following the task of identifying the most suitable materials to map against the developed qualification framework, the available resources were aligned using an additional column in the spreadsheet containing the QF. All 31 modules were mapped against the tasks and subtasks for where they may be used on the platform. In some instances, there may be the material used across several tasks and subtasks. When developing the unit of learning outcomes, it was envisioned to have shared ULOs where necessary. Figure 6 provides a snapshot of where the modules from BIMCert, BIMzeED and netUBIEP have been mapped to the tasks and subtasks of BIM Basics and BIM Management. This exercise has also highlighted where there are gaps in the current list of available resources. Any new material required can be developed in preparation for the revised set of learning materials (D5.3) and the final set at the end of the project (D5.4). To visualise the learning content's relationship to the BIM specialisms, a diagram has been

provided to demonstrate how the materials connect to the tasks and subtasks (Figure 7). This also shows where digital badges would be awarded for completion of the micromodules. The distribution of digital badges is recommended to be rewarded following the completion of tasks and subsequent specialisms. However, we require guidance and support from partners responsible for the platform architecture to establish the open badge strategy. Through collaboration with the relevant partners, this can be achieved. The outcome of the solution will influence the upskilling pathways of the ARISE learning platform.

Enrich specialisms with tasks and subtasks																							
ID1	Specialism	ID2	Task	ID3	Subtask	ULO No.	Profession	Notes	Source														
BB-1	BIM Basics	BB-1.1	Understand BIM Basics	BB-1.1.1	Understand BIM Fundamentals	1,	AR, PM, BO, FO, BI	Architect (AR) Project Manager (PM) Building Owner (BO) Forperson (FO) Building Inspector (BI)	BIM Cert: Introduction to BIM Fundamentals BIM Cert: Introduction to BIM Principles BIM Cert: BIM & Digitalisation Benefits - Overview BIM Cert: BIM Dimensions														
						2,																	
						3,																	
						BB-1.1.2				Understand BIM Terms & Definitions	BB-1.1.3	Understand BIM maturity levels	AR, PM, BO, FO, BI										
																4,							
						BB-1.2				Understand BIM and Energy Efficiency	BB-1.2.1	Understand BIM and Energy Efficiency					BIM Cert: BIM Terms & Definitions BIMzeED: What are BIM (Maturity) Levels? BIMzeED: Collaborative BIM to achieve nZEB BIM Cert: Introduction to Low Energy Building Construction BIM Cert: BIM Tools for Low Energy Construction BIM Cert: Energy System thinking: Key Principles BIM Cert: Intro to BIM Implementation						
		BA-1	BIM Management	BA-1.1	Implement BIM strategy		BA-1.1.1	Devise BIM-strategy	5,5a,5b,6,									AR, PM, BO,	BIM Cert: Intro to BIM Implementation				
																				BA-1.1.2	Manage organisational BIM-guidelines	6,	AR, PM, BO,
		BA-1.1.4	Develop project strategies for different groups a/o areas*																				
BA-1.2	Build stakeholder network									BA-1.2.1	Advise clients and other stakeholders on BIM-method	70,	AR, PM, BO,		BIM Cert: Digital Skills & Collaboration BIM Cert: Digital Skills & Collaboration - CDE BIM Cert: Digital Skills & Collaboration - Review BIM Models BIM Cert: Digital Skills & Collaboration - Accessing Information through the cloud BIM Cert: Digital Skills & Collaboration - Accessing Information through portable devices								
																BA-1.2.2	Identify stakeholders' needs and objectives*	71,	AR, PM, BO,				
																					BA-1.2.3	Integrate needs and objectives of stakeholders in organisational processes	72,
BA-1.3	Implement intra organisational BIM-training	BA-1.3.1	Develop training programme	73,	AR, PM, BO,																		
							BA-1.3.2	Facilitate intra organisational BIM-training	74,	AR, PM, BO,													
BA-1.4	Energy Efficiency for BIM Management	BA-1.3.2	Facilitate intra organisational BIM-training	7,7a,	AR, PM, BO,							BIMzeED: Collaborative BIM to achieve nZEB BIM Cert: BIM Tools for Low Energy Construction											
									7,7a,7b,	AR, PM, BO,													
		4,	AR, PM, BO,																				

Figure 6- Modules from BIMCert and BIMzeED aligned to BIM Basics Specialism



Figure 7- Modules from BIMCert and BIMzeED aligned to BIM Basics Specialism



4. Conclusion and Future Work

This report summarises the training materials identified from Deliverable 5.2 and provides an update with additional resources as supplied by BIMzeED and netUBIEP. Previously, a total of 13 learning modules were recommended to be re-used as part of the initial selection of materials for the ARISE projects. This has increased to 31 modules (Table 1).

Module Name	Source
Introduction to BIM Fundamentals	BIM Cert
BIM Terms & Definitions	BIM Cert
What are BIM (Maturity Levels)	BIM Cert
Energy system thinking - Key principles (divided into micro modules)	BIM Cert
Intro to BIM implementation: Impacts	BIM Cert
3D BIM Modelling	BIM Cert
Parametric BIM Objects	BIM Cert
Introduction to Low Energy Building Construction – Details (divided into micro modules)	BIM Cert
Digital Skills	BIM Cert
Digital Skills – Accessing Information through the cloud	BIM Cert
Digital Skills – Accessing Information through portable devices	BIM Cert
Digital Skills & Collaboration – CDE & File Structure	BIM Cert
Digital Skills & Collaboration – Review BIM Models	BIM Cert
LU1 – Collaborative BIM to achieve Nzeb	BIMzeED
LU2 – BIM and Nzeb for Workers	BIMzeED

LU3 – Nzeb Realisation and commissioning: Building Envelope and Air Tightness	BIMzeED
LU4 – Nzeb Realisation and commissioning: Building Services and Smart Technologies	BIMzeED
LU5 – Nzeb Realisation and commissioning: Quality Assurance	BIMzeED
LU6 – BIM Model Uses – during construction	BIMzeED
LU7 – BIM Model Uses – for specification and qualification	BIMzeED
LU8 – BIM Model Standardisation for Nzeb Design	BIMzeED
LU9 – Building Energy Modelling (BEM) Design and Export	BIMzeED
LU10 – Energy Simulation with BIM Tools	BIMzeED
LU11 – Nearly Zero Energy Building Facility Management	BIMzeED
LU12 – BIM in Facility Management Software (CMMS)	BIMzeED
Module 0 Basic BIM knowledge and skills	netUBIEP
Module 1 – Diffuse BIM	netUBIEP
Module 2 – Apply information management	netUBIEP
Module 3 – Apply procurement management	netUBIEP
Module 4 – Use BIM technology	netUBIEP
Module 5 – Analyse the BIM Model	netUBIEP

Table 1: Summary of current suite of materials available for ARISE



The training material will be updated and revised where necessary as the project progresses. Links to BIMzeED and netUBIEP material will be provided as recommended by the partners. Using the list of modules currently available, these were mapped against the current draft of the qualification framework. Apart from that, the selected learning content is found suitable to achieve project objectives and KPIs. At this stage, the material identified provides a solid foundation for the BIM Basics specialism. Any gaps identified in the learning content, in terms of participants' interest in specific topics and skills, will be noted and developed in *Deliverable 5.3 – Revised package of materials for and assessment strategies for the final round of trials.*

The next stage of the project will be heavily focused on collaborating with Belfast Met College in identifying and preparing the training material for piloting. To ensure these meet the project mission of upskilling a large number of market stakeholders and professionals across the European construction supply chain, in sustainable energy skills, the focus will be on providing learning content in the areas of energy savings, clean energy generation, investments in energy, and sustainability.