



Dedicated to stimulate demand for sustainable
energy skills in the construction sector

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Summary

The results of this report provide the basis for the further preparation of upskilling activities needed in the partner countries by building upon the experience of the previous BUILD UP Skills and Construction Skills projects and the work done so far in the BUSLeague project.

Based on national implementation plans in the partner countries, the focus of this report was to identify, assess and collate relevant upskilling content and resources (curricula, presentations, handbooks, demos, e-tools, schematics, etc.) from previous national and European projects. This was done through a collecting and reviewing process tuned to the specific needs of the project.

In the first phase, the partners were asked to clarify their national implementation plans and announce relevant upskilling trainings that are already available in their countries to build upon. In order to collect data and identify if an existing training scheme or module is relevant for the further implementation in BUSLeague, a specific collection scheme (including specific questions for further evaluation) was created. This collection scheme was filled in by the partner countries. According to this collection scheme, 60 trainings or training modules have been registered by the project partners.

In the second phase, in the extent to which these trainings can be used in BUSLeague was evaluated. To be able to assess the collected trainings according to a uniform scheme, a decision tree was created. Based on the assembled information on relevant trainings (training modules) available in the partner countries, this decision tree was used to find out whether the training or the training module is generally suitable for the implementation in the frame of the BUSLeague project. Moreover, it was clarified if the training or training module can only be implemented nationally or also internationally.

The evaluation of relevant training programmes and modules in partner countries led to the conclusion that most of them are (at least partly) within the specific scope of the BUSLeague EE-skills qualification¹. Unfortunately, the upskilling content and resources (such as general content descriptions, training materials, suggested examination procedures, lesson plans and descriptions of learning outcomes) of many of the training modules are only available in national languages. This means that these training modules cannot be used in other partner countries without further adaptation. Nevertheless, these training modules can be used nationally for the further implementation within BUSLeague, especially for the development of short training elements/modules.

The following identified training programmes and modules not only fall within the specific scope of the definition of the BUSLeague EE-skills qualification, but also provide upskilling content and resources in English. Therefore, they can be used in all partner countries to build upon, if national demand is identified.

Table 1: Collected trainings/training modules that can “potentially” be used in the partner countries (Source: Austrian Energy Agency)

No.	Country/Partner	Training (programme/module) title
1	Austria/AEA	Basics of Building Physics (Module of Building Inspection)
2	Austria/AEA	Quality Inspection of the Building Envelope (Module of Building Inspection)
3	Austria/AEA	Energy Balances and Demand Forecasts, Energy Certificates and Certification Programmes (Module of Building Inspection)
4	Austria/AEA	Renovation Concept (Module of Building Inspection)
5	Austria/AEA	General Tasks for the Building Inspection (Module of Building Inspection)
6	Austria/AEA	Monitoring Process (Module of Building Inspection)

¹ A specific scope of relevant qualifications to be developed within BUSLeague has been defined. For further information see chapter 3.

7	Austria/AEA	Building Operation (Module of Building Inspection)
8	Spain/BH and IVE	Energy Efficiency in Buildings
9	Ireland/TUS	NZEB Fundamentals (Attention: confirmation needed by the education training board if the available materials can be shared internationally)
10	Ireland/TUS	NZEB Retrofit (Attention: confirmation needed by the education training board if the available materials can be shared internationally)
11	Ireland/TUS	NZEB Ventilation (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
12	Ireland/TUS	NZEB Site Supervisor (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
13	Ireland/TUS	NZEB Electrical (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
14	Ireland/TUS	NZEB Plumbing (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
15	Ireland/TUS	NZEB Carpentry (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
16	Ireland/TUS	NZEB Bricklayers (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
17	Ireland/TUS	NZEB Plastering (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
18	Ireland/TUS	LU ² 1: NZEB Collaborative BIM ³ to Achieve NZEB (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
19	Ireland/TUS	LU2: BIM & NZEB for Workers (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
20	Ireland/TUS	LU4: NZEB Realisation & Commissioning: Building Services & Smart Technologies (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
21	Ireland/TUS	LU5: Realisation & Commissioning Quality Assurance (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
22	Ireland/TUS	LU6: BIM Model Uses during Construction (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
23	Ireland/TUS	LU7: BIM Model Uses for Specification & Quantification (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
24	Ireland/TUS	LU8: BIM Model Standardisation for NZEB Design (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
25	Ireland/TUS	LU11: NZEB Building Facility Management (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) BIMzeED

² Learning Unit (LU)

³ Building Information Modelling (BIM)

26	Ireland/TUS	LU12: BIM in Facility Management Software (CMMS) (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
27	Bulgaria/EnEffect	Fit-to-NZEB Programmes on Deep Energy Retrofitting
28	Bulgaria/EnEffect	CraftEdu Programmes for: 1. HVAC ⁴ Installers 2. Carpenters 3. Electricians (High Voltage) 4. Installers of Windows and Doors 5. Hydro-Insulators (Roofs and Foundations) 6. Electricians (Low Voltage) 7. Chimney Sweepers (Installation) 8. Chimney Sweepers (Inspection)

Finally, based on these evaluation results, the partner countries adapted and detailed their national implementation strategies within the BUSLeague project.

⁴ Heating, Ventilation and Air Conditioning (HVAC)

I Introduction

This report provides the basis for the further preparation of upskilling activities needed in the partner countries by building upon the experience of the previous BUILD UP Skills and Construction Skills projects and the work done so far in the BUSLeague project.

Based on national implementation plans in the partner countries, the focus of this report is to identify, assess and collate relevant upskilling content and resources (curricula, presentations, handbooks, demos, e-tools, schematics, etc.) from previous national and European projects. This is done through a collecting and reviewing process tuned to the specific needs of the project.

In the first phase, the partners were asked to clarify their national implementation plans and announce relevant upskilling trainings that are already available in their countries to build upon. In the second phase, the extent to which these trainings can be used in BUSLeague was evaluated. Specifically, it was analysed

- in which detail upskilling content and resources are available,
- if the upskilling content of the identified trainings is already described according to a methodology that allows compiling training measures in line with the developed qualification (cf. description of competences/units of learning outcomes) and mutual recognition,
- what the training modules contain depending on their field of application
- and if the trainings (training modules) can be used nationally or internationally.

For the analysis, a specific decision tree was created to evaluate the upskilling content and resources.

Finally, the impact of the evaluation results on the further implementation of trainings in the partner countries is described by the actual national implementation strategies.

2 Collecting of relevant upskilling content and resources

Based on the national implementation plans of the project partners, relevant existing upskilling trainings have been collected. Moreover, the partners specified if the upskilling content of the identified trainings is already described according to a methodology that allows mutual recognition (comparable description of competences/units of learning outcomes).

2.1 Collection scheme

In order to collect data and identify if an existing training scheme or module is relevant for the further implementation in BUSLeague, a specific collection scheme (including specific questions for further evaluation) was created. This collection scheme (an Excel table) has been filled in by the partner countries (either entire training sessions or just training modules have been entered). The following topics/questions needed to be mentioned/answered by the partners for each registered existing training/training module.

- Country where the training/training module is available
- Title of the training/training module
- Connection of the training/training module to a European or national project
- Target group of the training/training module
- Kind of training implementation so far (on site, off site, online...)
- Suitability for use in the frame of BUSLeague (in DIY/hardware stores, practical training centres, wholesale companies, supplier trainings...)
- General content description (available only in the national language or also in English)
- Available training materials (available only in the national language or also in English)
- Requirements for admission to the training/training module
- Examination procedure of the training/training module (available only in the national language or also in English)
- Lesson plan of the training/training module (available only in the national language or also in English)
- Description of learning outcomes (available only in the national language or also in English)

The collected information was crucial, on the one hand, to evaluate the training and, on the other hand, to give an overview of existing relevant training courses and modules in the partner countries.

Based on the collected information in combination with the subsequent evaluation, the partner countries can decide whether the registered training courses or training modules from other countries are also suitable for national implementation.

2.2 Collected trainings and training modules

According to the collection scheme described above, 60 trainings or training modules have been registered by the project partners. The following list gives an overview of the collected trainings and shows training (module) title, the country of implementation and the partner who registered it.

Table 2: Collected trainings/training modules (Source: Austrian Energy Agency)

No.	Country/Partner	Training (module) title
1	Austria/AEA	Basics of Building Physics (Module of Building Inspection)
2	Austria/AEA	Building Materials (Module of Building Inspection)

3	Austria/AEA	Quality Inspection of the Building Envelope (Module of Building Inspection)
4	Austria/AEA	Heating Technology (Module of Building Inspection)
5	Austria/AEA	Ventilation Technologies (Module of Building Inspection)
6	Austria/AEA	Control Systems for Heating, Ventilation and Air Conditioning (Module of Building Inspection)
7	Austria/AEA	Air Conditioning Technologies (Module of Building Inspection)
8	Austria/AEA	Energy Balances and Demand Forecasts, Energy Certificates and Certification Programmes (Module of Building Inspection)
9	Austria/AEA	Renovation Concept (Module of Building Inspection)
10	Austria/AEA	General Tasks for the Building Inspection (Module of Building Inspection)
11	Austria/AEA	Monitoring Process (Module of Building Inspection)
12	Austria/AEA	BIM Systems (Module of Building Inspection)
13	Austria/AEA	Building Operation (Module of Building Inspection)
14	Netherlands/ISSO	NZEB Ventilation
15	Netherlands/ISSO	NZEB Airtightness
16	Netherlands/ISSO	Hydraulic Balancing
17	Spain/BH and IVE	Energy Efficiency in Buildings
18	Spain/IVE	EE Building Renovation
19	Ireland/TUS	NZEB Fundamentals
20	Ireland/TUS	NZEB Retrofit
21	Ireland/TUS	NZEB Ventilation
22	Ireland/TUS	NZEB Site Supervisor
23	Ireland/TUS	NZEB Electrical
24	Ireland/TUS	NZEB Plumbing
25	Ireland/TUS	NZEB Carpentry
26	Ireland/TUS	NZEB Bricklayers
27	Ireland/TUS	NZEB Plastering
28	Ireland/TUS	LU1: NZEB Collaborative BIM to Achieve NZEB – BIMzeED
29	Ireland/TUS	LU2: BIM & NZEB for workers – BIMzeED
30	Ireland/TUS	LU4: NZEB Realisation & Commissioning: Building Services & Smart Technologies – BIMzeED
31	Ireland/TUS	LU5: Realisation & Commissioning Quality Assurance – BIMzeED
32	Ireland/TUS	LU6: BIM Model Uses during Construction – BIMzeED
33	Ireland/TUS	LU7: BIM Model Uses for Specification & Quantification – BIMzeED
34	Ireland/TUS	LU8: BIM Model Standardisation for NZEB Design – BIMzeED
35	Ireland/TUS	LU11: NZEB Building Facility Management – BIMzeED
36	Ireland/TUS	LU12: BIM in Facility Management Software (CMMS) – BIMzeED
37	Bulgaria/EnEffect	Building Envelope
38	Bulgaria/EnEffect	Buildings Systems
39	Bulgaria/EnEffect	Building Market, Products and Technologies
40	Bulgaria/EnEffect	7 modules on RES: PV Systems, Mini-wind, Heat Pumps, Biomass, Solar Thermal, HVAC, Hybrid Systems
41	Bulgaria/EnEffect	Certified Passive House Tradesperson course
42	Bulgaria/EnEffect	Upskilling Courses under Train-to-NZEB
43	Bulgaria/EnEffect	Fit-to-NZEB Programmes on Deep Energy Retrofitting
44	Bulgaria/EnEffect	CraftEdu Programmes for: 1. HVAC installers 2. Carpenters 3. Electricians (High Voltage) 4. Installers of Windows and Doors 5. Hydro-Insulators (Roofs and Foundations) 6. Electricians (Low Voltage)

		7. Chimney Sweepers (Installation) 8. Chimney Sweepers (Inspection)
45	France/ PF and AVE	FeeBat Audit Reno
46	France/ PF and AVE	FeeBat Renovates
47	France/ PF and AVE	FeeBat Ancient Buildings
48	France/ PF and AVE	FeeBat Opaque Walls
49	France/ PF and AVE	FeeBat Carpentries
50	France/ PF and AVE	FeeBat Heating
51	France/ PF and AVE	FeeBat Ventilation
52	France/ PF and AVE	FeeBat Electricity
53	France/ PF and AVE	Qualibat (elements)
54	France/ PF and AVE	RGE
55	France/ PF and AVE	PACTE (elements)
56	France/ PF and AVE	PRAXIBAT Ventilation
57	France/ PF and AVE	PRAXIBAT Carpentry
58	France/ PF and AVE	PRAXIBAT Envelop
59	France/ PF and AVE	PRAXIBAT Lighting
60	France/ PF and AVE	MOOC Bâtiment Durable

The further evaluation process and the correspondent findings are described in the following chapters.

3 Collecting of relevant upskilling content and resources

In order to be able to evaluate all trainings according to a uniform scheme, a decision tree was created. Based on the collected information on relevant trainings (training modules) available in the partner countries, this decision tree can be used to find out whether the training or the training module is generally suitable for the implementation in the frame of the BUSLeague project. Moreover, after the evaluation, it can be clarified if the training or training module can only be implemented nationally or also internationally.

3.1 Evaluation process

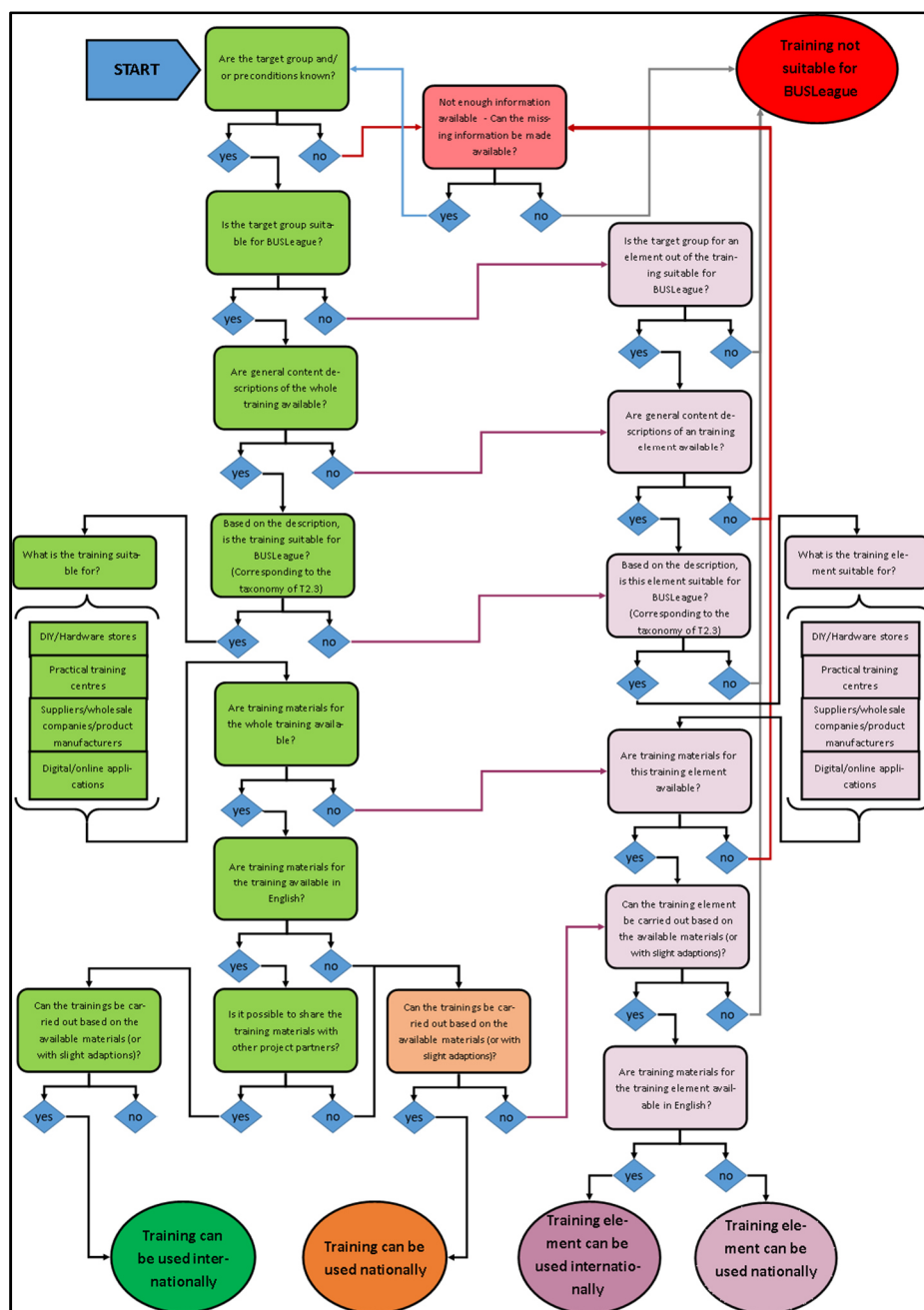


Figure 1: Decision tree developed as basis for the evaluation process (Source: Austrian Energy Agency)

In order to be able to evaluate a training or training module, the decision tree must be started in the upper left corner. Then, the questions of the decision tree are answered following the arrows.

In the first step, it is examined whether the target group is known and suitable for BUSLeague. If the target group is suitable, the next step is an assessment whether a clear general content description is available and, if so, whether the general content description is in line with the scope of the BUSLeague EE-skills qualification.

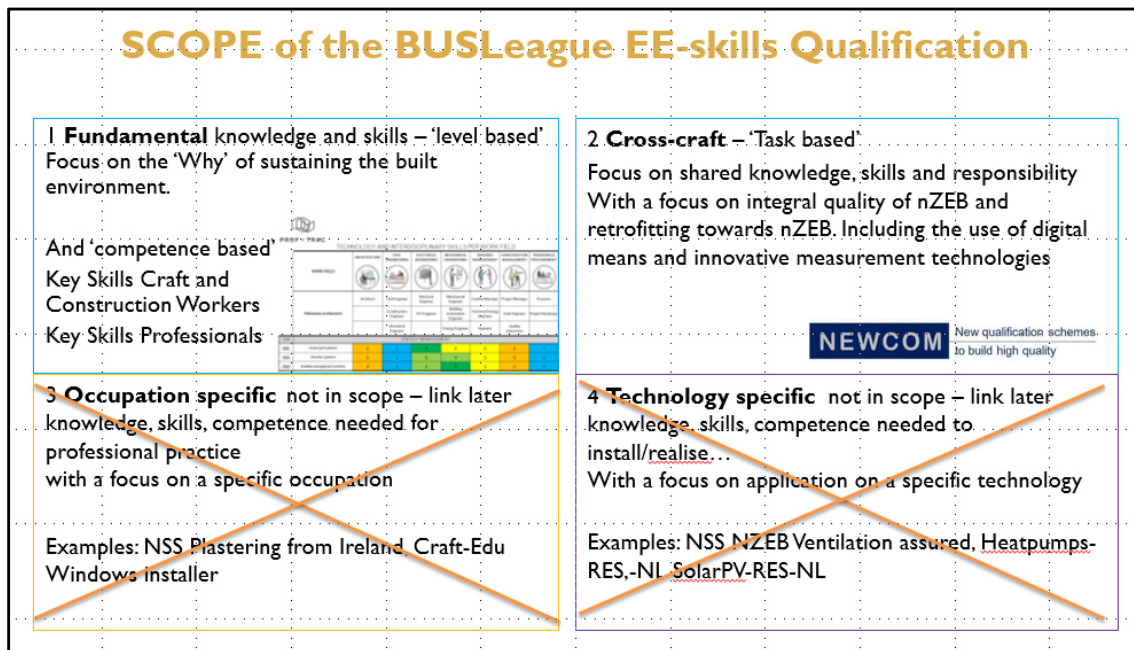


Figure 2: Scope of the BUSLeague EE-skills qualification (Source: ISSO)

If the training/training module is within the scope of the BUSLeague EE-skills qualification, the next step is to clarify for which kind of implementation the training/training module is suitable (implementation in DIY/hardware stores, practical training centres, wholesale companies...).

Moreover, it has to be determined if all training materials needed for the implementation of the training/ training module are available. On this issue, the evaluation process goes into detail and further clarifies:

- Are the training materials available in English?
- Can the training materials be shared with other project partners (focus on copy right issues)?
- Can the trainings/training modules be carried out on the basis of the available materials?

Since the decision tree can be used both for entire trainings and for specific training modules, it includes a second decision cycle for the evaluation of training modules.

4 Evaluation results

Based on the collected information on relevant trainings (training modules) and the developed evaluation process (decision tree), the partners have been asked to evaluate the collected trainings/training modules implemented in their countries. The following chapter summarizes the corresponding results.

4.1 Austria

In Austria, the following training modules have been identified and registered according to the developed collection scheme.

1. Basics of Building physics
2. Building Materials
3. Quality Inspection of the Building Envelope
4. Heating Technology
5. Ventilation Technologies
6. Control Systems for Heating, Ventilation and Air Conditioning
7. Air Conditioning Technologies
8. Energy Balances and Demand Forecasts, Energy Certificates and Certification Programmes
9. Renovation Concept
10. General Tasks for the Building Inspection
11. Monitoring Process
12. BIM Systems
13. Building Operation

These 13 modules were developed within the European project NEWCOM (www.newcomtraining.com) for blue-collar workers and energy consultants and were carried out partly as off-site and partly as on-site training during the runtime of the project (as part of the implementation of a blower-door test).

Since these training modules have been developed within a European project, general content descriptions, training materials, suggested examination procedures, lesson plans and descriptions of learning outcomes are available in German and English. This makes it possible for the modules to be also used in partner countries (if they identify national demand).

As already mentioned, the target groups for these training modules are blue-collar workers in the construction sector and energy consultants. As a result, the modules are suitable to be used in practical training centres or in on-site trainings. Furthermore, we assume that the training modules are also suitable for suppliers and product manufacturers to train their workers as in BUSLeague.

Taking into account the specific scope of the BUSLeague EE-skills qualification, the following training modules are perfectly aligned:

1. Basics of Building Physics
2. Quality Inspection of the Building Envelope
3. Energy Balances and Demand Forecasts, Energy Certificates and Certification Programmes
4. Renovation Concept
5. General Tasks for the Building Inspection
6. Monitoring Process
7. Building Operation

The training modules Building Materials, Heating Technology, Ventilation Technologies, Air Conditioning Technologies and BIM Systems are partly very technology and occupation-specific.

However, it would be possible to adapt these modules to focus more on foundational knowledge and delete overly detailed technology and job-specific content.

To conclude, it can be stated that the identified and registered Austrian training modules are particularly suitable to be implemented nationally and internationally within the BUSLeague project.

4.2 The Netherlands

In the Netherlands, the following training modules have been identified and registered according to the developed collection scheme.

1. NZEB Ventilation
2. NZEB Airtightness
3. Hydraulic Balancing

The training module NZEB Ventilation was developed within the European project NEWCOM for blue-collar workers and was implemented as an off-site training during the runtime of the project. Unfortunately, the training content description and training materials are only available in the national language. Nevertheless, the suggested examination procedures, lesson plans and descriptions of learning outcomes are available in Dutch and English. This fact precludes that this training module can be used in the partner countries without further adaption and/or support by the Dutch partner (if the other partner countries identify national demand). The training is suitable to be conducted in DIY/hardware stores and practical training centres and to be used by suppliers and product manufacturers to train their workers. Moreover, it can be used for digital/online applications.

The training module NZEB Airtightness was developed within several European projects for blue-collar and white-collar workers and was implemented as an off-site training. Unfortunately, the training content description, training materials, lesson plans and descriptions of learning outcomes are only available in the national language. This fact precludes that this training module can be easily used in the partner countries without further adaption and/or support by the Dutch partner (if the other partner countries identify national demand). The training is suitable to be conducted in DIY/hardware stores and practical training centres and to be used by suppliers and product manufacturers to train their workers. Moreover, it can be used for digital/online applications.

The training module Hydraulic Balancing was not developed as part of a European project and was implemented so far nationally as an off-site training. Therefore, the training content description, training materials, lesson plans and descriptions of learning outcomes are only available in the national language. This fact precludes that this training module can be easily used in the partner countries without further adaption and/or support by the Dutch partner (if the other partner countries identify national demand). The training is suitable to be conducted in DIY/hardware stores and practical training centres and to be used by suppliers and product manufacturers to train their workers. Moreover, it can be used for digital/online applications.

4.3 Spain

In Spain, two training modules have been identified and registered according to the developed collection scheme.

1. Energy Efficiency in Buildings
2. EE Building Renovation

The training module EE Building Renovation was developed within the European project Construye 2020 for blue-collar and white-collar workers and was implemented off site during the runtime of the project. Unfortunately, the training content description and training materials, examination procedures, lesson plans and descriptions of learning outcomes are only available

in the national language. This fact precludes that this training module can be used by other project partners without major further adaptations.

The training module Energy Efficiency in Buildings is currently under development for Bauhaus (a DIY/hardware store). The training module focuses on blue-collar workers and will be implemented during the runtime of the BUSLeague project. The training will be online via a Moodle platform. The training content description, training materials, lesson plans and descriptions of learning outcomes are currently under development in the national language. This fact precludes that this training module can be easily used in the partner countries without further adaption and/or support by the Spanish partner (if the other partner countries identify national demand). Nevertheless, the Spanish partner underlines their effort to make this training module usable for the other partners if demand is identified. The suitability of this training (beside the use in DIY/hardware stores) has not yet been determined.

4.4 Bulgaria

In Bulgaria, numerous training modules and programmes have been identified and registered according to the developed collection scheme.

Four of these training modules were developed within the EU project BUS EnerPro aiming at upskilling blue-collar workers and were implemented as classroom trainings. Unfortunately, the training content description and training materials, examination procedures, lesson plans and descriptions of learning outcomes are only available in the national language. This fact precludes that these training modules can be easily used in the partner countries without further adaption and/or support by the Bulgarian partner (if the other partner countries identify national demand). The trainings are suitable to be conducted in practical training centres and to be used by suppliers and product manufacturers.

Moreover, eight trainings were developed in Bulgaria in line with the CraftEdu programme. They focused on upskilling blue-collar workers and were implemented as online courses. Project general content descriptions, training materials, suggested examination procedures, lesson plans and descriptions of learning outcomes are available in Bulgarian and English. This allows for the modules to be also used in the partner countries (if the partner countries can identify national demand). These trainings are suitable to be conducted in practical training centres or as on-site training and to be also used by suppliers and product manufacturers to train their workers. Moreover, they can be used for digital/online applications. Furthermore, trainings on deep energy retrofitting were developed within the training programme of the European project Fit-to-NZEB for blue-collar and white-collar workers. The trainings were developed as off-site/classroom trainings. The general content descriptions, training materials, suggested examination procedures, lesson plans and descriptions of learning outcomes are available in Bulgarian and English. This allows for the modules to be also used in the partner countries (if the partner countries can identify national demand). These trainings are suitable to be conducted in practical training centres or as on-site training and to be also used by suppliers and product manufacturers to train their workers. Moreover, they can be used for digital/online applications.

Additionally, a “Certified Passive House Tradesperson course” has been developed as off-site/classroom training in Bulgaria. Although general content descriptions, training materials, suggested examination procedures, lesson plans and descriptions of learning outcomes are available in Bulgarian and English, it has to be mentioned that they are only accessible after signing a contract as a course supplier with the Passive House Institute – Darmstadt, Germany. Materials cannot be used for other purposes without the express consent of the owner. This limits the usage of this course within the BUSLeague project. Nevertheless, this course is suitable to be conducted in practical training centres or as on-site training and to be also used by suppliers and product manufacturers to train their workers. Moreover, they can be used for digital/online applications.

Finally, the trainings developed within the training programme of the European Union project Train-to-NZEB for blue-collar workers have also been registered. The trainings were developed as off-site/classroom trainings. General content descriptions, training materials, suggested

examination procedures, lesson plans and descriptions of learning outcomes are only available in Bulgarian. This precludes that these training modules can be easily used in the partner countries without further adaption and/or support by the Bulgarian partner (if the other partner countries identify national demand). These trainings are suitable to be conducted in practical training centres or as on-site training and to be also used by suppliers and product manufacturers to train their workers. Moreover, they can be used for digital/online applications.

4.5 Ireland

In Ireland, the following 17 training modules have been identified and registered according to the developed collection scheme.

1. NZEB Ventilation
2. NZEB Site Supervisor
3. NZEB Electrical
4. NZEB Plumbing
5. NZEB Carpentry
6. NZEB Bricklayers
7. NZEB Plastering
8. NZEB Retrofit
9. NZEB Fundamentals
10. LU1: NZEB Collaborative BIM to Achieve NZEB – BIMzeED
11. LU2: BIM & NZEB for Workers – BIMzeED
12. LU4: NZEB Realisation & Commissioning: Building Services & Smart Technologies – BIMzeED
13. LU5: Realisation & Commissioning Quality Assurance – BIMzeED
14. LU6: BIM Model Uses during Construction – BIMzeED
15. LU7: BIM Model Uses for Specification & Quantification – BIMzeED
16. LU8: BIM Model Standardisation for NZEB Design – BIMzeED
17. LU11: NZEB Building Facility Management – BIMzeED
18. LU12: BIM in Facility Management Software (CMMS) – BIMzeED

The trainings 1 to 7 have been developed for blue-collar and white-collar workers as an off-site training. The BIMzeED training has been developed within a European Union project. As a result, the content, description, training materials, examination procedures, lesson plans and descriptions of learning outcomes of all trainings are available in English. This allows for these training modules to be used by the other project partners without major adaptations. The trainings NZEB Retrofit and NZEB Fundamentals fully correspond to the scope of the BUSLeague EE-skills qualification, but the education training board must confirm if the available materials can be shared internationally.

The trainings 10 to 18 have been developed for blue-collar and white-collar workers as off-site training. The BIMzeED training has been developed within a European Union project. As a result, the content, description, training materials, examination procedures, lesson plans and descriptions of learning outcomes of all trainings are available in English. This allows for these training modules to be used by the other project partners without major adaptations. Unfortunately, not all trainings are fully within the scope of the BUSLeague EE-skills qualification, but some are. These training modules are suitable to be conducted in practical training centres or as on-site and digital/online training and to be also used by suppliers and product manufacturers to train their workers.

4.6 France

In France, the following 16 training modules have been identified and registered according to the developed collection scheme:

1. FeeBat Audit Reno
2. FeeBat Renovates
3. FeeBat Ancient Buildings
4. FeeBat Opaque Walls
5. FeeBat Carpentries
6. FeeBat Heating
7. FeeBat Ventilation
8. FeeBat Electricity
9. Qualibat (some elements)
10. RGE
11. PACTE (some elements)
12. PRAXIBAT Ventilation
13. PRAXIBAT Carpentry
14. PRAXIBAT Envelop
15. PRAXIBAT Lighting
16. MOOC Bâtiment Durable

The trainings have been mainly developed for blue-collar workers as off-site training, but not within a European Union project. Therefore, the training content description and training materials, examination procedures, lesson plans and descriptions of learning outcomes are not available in English. Moreover, it is only possible to share the training materials from Qualibat and MOOC Bâtiment Durable with other partners. All this precludes that these training modules can be used by the other project partners without major adaptations.

Nevertheless, the evaluation came to the conclusion that eleven of these trainings and content elements from the FeeBat and PRAXIBAT programmes (excluding FeeBat Ancient Buildings) can be used nationally by the French partner for the further implementation within BUSLeague.

4.7 Conclusion

The evaluation of relevant training programmes, trainings and training modules in the partner countries leads to the conclusion that most of them are (at least partly) within the specific scope of the definition of the BUSLeague EE-skills qualification.

Unfortunately, the upskilling content and resources (general content descriptions, training materials, suggested examination procedures, lesson plans and descriptions of learning outcomes) of many of the training modules are only available in national languages. This precludes that these training modules can be easily used in other partner countries without further adaptation. Nevertheless, these training modules can be used nationally for the further implementation within BUSLeague, especially for the development of short training elements/modules.

The following identified training programmes, trainings and training modules are within the specific scope of the definition of the BUSLeague EE-skills qualification and can provide upskilling content as well as resources in English. Therefore, they can be used in the partner countries if national demand is identified.

Table 3: Collected trainings/training modules that can “potentially” be used in the partner countries (Source: Austrian Energy Agency)

No.	Country/Partner	Training (programme/module) title
1	Austria/AEA	Basics of Building Physics (Module of Building Inspection)
2	Austria/AEA	Quality Inspection of the Building Envelope (Module of Building Inspection)
3	Austria/AEA	Energy Balances and Demand Forecasts, Energy Certificates and Certification Programmes (Module of Building Inspection)

4	Austria/AEA	Renovation Concept (Module of Building Inspection)
5	Austria/AEA	General Tasks for the Building Inspection (Module of Building Inspection)
6	Austria/AEA	Monitoring Process (Module of Building Inspection)
7	Austria/AEA	Building Operation (Module of Building Inspection)
8	Spain/BH and IVE	Energy Efficiency in Buildings
9	Ireland/TUS	NZEB Fundamentals (Attention: confirmation needed by the education training board if the available materials can be shared internationally)
10	Ireland/TUS	NZEB Retrofit (Attention: confirmation needed by the education training board if the available materials can be shared internationally)
11	Ireland/TUS	NZEB Ventilation (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
12	Ireland/TUS	NZEB Site Supervisor (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
13	Ireland/TUS	NZEB Electrical (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
14	Ireland/TUS	NZEB Plumbing (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
15	Ireland/TUS	NZEB Carpentry (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
16	Ireland/TUS	NZEB Bricklayers (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
17	Ireland/TUS	NZEB Plastering (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification)
18	Ireland/TUS	LU1: NZEB Collaborative BIM to Achieve NZEB (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
19	Ireland/TUS	LU2: BIM & NZEB for Workers (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
20	Ireland/TUS	LU4: NZEB Realisation & Commissioning: Building Services & Smart Technologies (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
21	Ireland/TUS	LU5: Realisation & Commissioning Quality Assurance (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
22	Ireland/TUS	LU6: BIM Model Uses during Construction (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
23	Ireland/TUS	LU7: BIM Model Uses for Specification & Quantification (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
24	Ireland/TUS	LU8: BIM Model Standardisation for NZEB Design (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
25	Ireland/TUS	LU11: NZEB Building Facility Management (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED

26	Ireland/TUS	LU12: BIM in Facility Management Software (CMMS) (Attention: not the whole training but selected training modules correspond to the scope of the BUSLeague EE-skills qualification) – BIMzeED
27	Bulgaria/EnEffect	Fit-to-NZEB Programmes on Deep Energy Retrofitting
28	Bulgaria/EnEffect	<p>CraftEdu Programmes for:</p> <ol style="list-style-type: none"> 1. HVAC installers 2. Carpenters 3. Electricians (High Voltage) 4. Installers of Windows and doors 5. Hydro-insulators (Roofs and Foundations) 6. Electricians (Low Voltage) 7. Chimney sweepers (Installation) 8. Chimney sweepers (Inspection)

5 Actual national implementation strategies

On the basis of the evaluation results on the further implementation of trainings in the partner countries, the adapted, actual national implementation strategies are described in the following chapter.

5.1 Austria

In Austria, the national climate protection network (**klimaaktiv**) is actively used on an ongoing basis to identify energy skills that are actually needed and possibilities to support the recognition of correspondent trainings.

Moreover, a specific national focus has been laid on cooperation with national supplier networks to determine presently successful supplier trainings. Already during the project preparation phase, relevant stakeholders from various trades were identified for further collaboration through their umbrella associations. In this context, meetings were held with product manufacturers and their unions during the implementation of BUSLeague. The Austrian Energy Agency carried out one-on-one meetings (online due to the pandemic) with

- the Austrian association of heat pumps,
- the Austrian association of comfort ventilation,
- the Austrian association of solar thermal plants,
- the Austrian association for the education of energy consultants,
- the heat pumps manufacturer Ochsner,
- the building equipment manufacturer Siblik,
- and the pumps manufacturer Wilo.

All these organisations offer training to their target group (installers, planners, engineers and energy experts).

Based on the findings as well as the project orientation (defined scope of the BUSLeague EE-skills qualification), it was decided to determine national energy advisors as target group for the trainings primarily because it is known from past projects that they are willing to undergo further education according to the holistic focus of the BUSLeague topics (e.g., cross trade issues).

Currently, the following trainings topics are under development (in cooperation with the further education institute EASt/ Arge eba):

- Construction site procedures in connection with the implementation of a renovation roadmap
- Interpretation of available quality checks on the building site
- Management of ecological construction material on the building site

These modules are based on the Building Inspector training developed in the NEWCOM project (see chapter 4.1). The implementation of the trainings will adapt to the actual market needs (on-site training, digital training...). To enable the possibility for mutual recognition of skills/competences, competence descriptions of these trainings will be developed and integrated into the compiled qualification for the recognition of energy skills. Accordingly, the use and implementation of digital means for the recognition of skills and upskilling will be a national focus. Therefore, our aim is to explore the BUILD UP Skills advisor app (further development of the NEWCOM competence database).

5.2 Bulgaria

While the national qualification system provides well-structured and relatively flexible certification opportunities – without, however, focusing on energy efficiency and sustainability skills –, the supply of upskilling services expected to complete the void is underdeveloped and there are no existing frameworks for market recognition. This has a negative impact on the demand for energy efficiency skills for both blue-collar workers and specialists, especially when combined with the perceived low quality of vocational training services and the general lack of market demand for quality energy-efficient buildings. The lack of continuing professional development (CPD) requirements at any level, even voluntary ones, results in fragmented and unstable supply of training services, often driven only by available financing from national or international sources.

However, there are certain existing resources and best practices, which will be used by the Bulgarian team. The most important ones are as follows:

BUILD UP Skills EnerPro

The project has developed 10 distinctive training programmes (3 on energy efficiency topics and 7 on renewable energy systems) with a duration of 40 to 60 hours, offering flexible upskilling/specialisation courses “on parts of the profession”, resulting in a nationally recognised qualification certificate. The programmes and materials are in Bulgarian freely available to all interested training providers through signing of a cooperation agreement.

Certified Passive House Tradesperson course

The BUILD UP Skills project set up a partnership with the Germany-based Passive House Institute, developing capacities for offering certified training programmes, and eventually resulting in incorporating passive house-relevant learning outcomes in the state educational standards.

Train-to-NZEB

The project used available national and international certification programmes and newly-established practical training facilities (Building Knowledge Hubs, BKHs) to develop shorter upskilling courses combined with distance learning tools, as e.g., the platform Buildingreen.net. The following list shows training topics for different target groups, which are fully applicable under BUS League:

- Tradespeople: building envelope; building systems; building market, products and technologies; photovoltaic systems; solar thermal; biomass; mini-wind; heating ventilation and AC; hybrid systems; passive house; air tightness; ventilation systems with heat recovery; and insulation systems and thermal bridges
- Specialists: passive house designer/consultant; NZEB design basics; air tightness; ventilation systems and heat recovery; insulation systems and thermal bridges; renewable energy systems in NZEBs
- Non-specialists: PH/NZEB economics; PH/NZEB basics; PH/NZEB design basics; air tightness; ventilation systems with heat recovery; insulation, PH windows and thermal bridges; RES in NZEBs

Fit-to-NZEB:

The project developed units of learning outcomes, exemplary educational plans and programmes for each relevant qualification under the European qualification framework (EQF 3-7). The programmes are publicly available, including a full set of materials on 17 distinctive topics. Each of the topics is relevant to the activities planned under BUSLeague as the available materials will be fully exploited to fuel upskilling courses at all levels.

CraftEdu:

During the project CraftEdu, two main programmes were developed for Bulgaria:

- Windows and glazing: Target groups are craftsmen and on-site workers with professional qualifications as builder-installers but with no previous specialisation in windows and glazing, who are interested in obtaining professional knowledge and skills in window installation relevant in the field of energy efficiency of buildings
- Energy efficiency in buildings – flat roof waterproofing: Target groups are craftsmen and construction workers, as well as persons interested in acquiring professional knowledge and skills in the field of hydro insulation of flat roofs in regard to principles of energy efficiency and renewable energy systems in buildings

The demand side, however, remains underdeveloped. This is to a significant extent linked to the failure to impose legal requirements for NZEB design and construction and the lowest-price driven real estate market, but it is also related to the lack of skills recognition and the missing CPD system. On the other hand, a number of product manufacturers and suppliers have been very active in promoting their innovative products enhancing the energy characteristics of buildings, in many cases in cooperation with branch organisations, VET providers and the non-governmental sector, including the Bulgarian BKH. This pure market endeavour has contributed much more significantly to the increase in market demand for quality construction services than national policies. However, it has its own limitations, such as lack of coherence with the national educational system and the limited scope. The same applies to the existing training and certification schemes under international building standards, which, despite their indisputable value and impact, cannot single-handedly deliver a major shift in the construction practice at national level.

To cover these gaps, the Bulgarian team in BUSLeague will undertake the following activities:

- Developing a blended learning platform providing web-based facilities for skills mapping and modular training leading to recognised certification. The learning platform is the instrument to introduce a broader CPD system for related professions in Bulgaria. The idea is that we will use the platform to offer skills mapping, direct users to suitable courses and provide blended learning opportunities by combining distance learning content through the platform with physical training from multiple training providers.
- Linking the platform to the training supply, including offers within the national qualification system, international certification schemes, training by product manufacturers and suppliers and existing programmes developed by international projects as described above.
- Networking, mediating and collaborating with national branch chambers, professional associations and education providers to recognise the system and initiate a qualification register on its basis.
- Increasing demand through policy advocacy related to requirements for skilled construction services, support of pilot projects, live demonstrations, open training courses and media events.
- Collaborating with market players such as DIY stores and product manufacturers to link the correct application of their products with professional upskilling and jointly organising large public awareness-raising events.

As immediate next steps, close collaboration with other ongoing activities as the INSTRUCT and NZEB Roadshow projects will be formed to develop a common strategy and time plan for the implementation of the above actions.

Several product manufactures establish trainings that are for their own employees as well as competitors. A major advantage of these training courses is that the trainers come from business practice and, therefore, can convey the content in a more practical way than trainers without any practical experiences from training centres. The courses by manufacturers are mostly focused on a certain product or system and are not destined to develop broader competences or learning outcomes leading to professional qualification. However, it is true that they offer good quality and are recognised by the market. If they can be integrated into the platform

described above (meaning manufacturers must work on the units of learning outcomes, ULOs), this would contribute to its recognition as well. Ad hoc training is actually offered by most manufacturers, however Bauplan, Knauf Insulation, Weber/Saint Gobain, Wienerberger, Xella, Allukoenigstahl are among the most active. Some of them also maintain licensed vocational training centres, but the trainings are not done on regular basis, but mostly on demand, or when a new product enters the market.

Most of the programmes with respective sets of learning outcomes are available in English. Not all training materials are, however, available in English or are subject to memoranda with VET providers. Programmes and materials under Fit-to-NZEB can hopefully be useful in future activities.

5.3 France

The French regulatory targets in terms of energy efficiency in buildings are to achieve 500,000 BBC renovations⁵ per year by encouraging the financial and technical support of house owners, and by increasing the amount of workers and upskilling them. These two mechanisms require in some way a stock of transferable knowledge that responds to the objectives associated with the different kinds of public. As a result, the implementation plan draws strategies for matching the identified demanded skills for a given context with the available contents in four areas:

1. Information and awareness campaigns: Reaching the selected target groups (owners, decision makers and “influencers”, and craftsmen and SMEs⁶) will be done by taking advantage of the partnerships with DIY/hardware stores, suppliers, and professional organisations, but also by using methodologies and tools like the Support for Prospective Dialogue method (SPD in its French acronym). The objective of these campaigns will be to stimulate demand for deep renovations and energy skills; the content here should be merely informative, similar to the introductory chapters of the selected programmes.
2. Improvement of EE skills: The supply of EE skills and their assessment can be reached by enhancing on-site trainings. These kinds of trainings are usually designed to be delivered in classrooms or training centres with an intended number of participants that corresponds to “large” or “average-sized” worksites. The challenge for the team will be to implement them at “small” worksites, while gaining market recognition. Thus, it is possible to adjust the selected programmes FeeBat and PRAXIBAT, also to add QUALIBAT elements, and adapt them to the context requirements.

The results of these actions will be certified based on the RGE label⁷ and promoted and implemented with the support of the national network “FeeBat certified trainers”. With regard to external audiences, this process requires the involvement of stakeholders such as skills operators⁸ like Constructys, electric utility companies like EDF, and industry organisations like the French Agency for Quality in Constructions (AQC), but also the commitment of public authorities to use tools like the “training clause” (already implemented in the Hauts-De-France region during the last two years).

3. Improvement of the sourcing of qualified workers: The main objective is to increase the flow of qualified workers in the building sector. This will be done by implementing *Bâtis Ton Projet* (BTP), a methodology and tool developed by Practee seeking to attract the interest of potential construction workers.
4. Development and implementation of local strategies: The challenge is to align the interest of stakeholders with those of the project. The goals of deep renovation and upskilling can be

⁵ https://www.bbc.co.uk/homes/property/improving_renovating.shtml

⁶ Small and medium enterprises (SMEs)

⁷ French quality label for craftsman

⁸ Associations that support the upskilling process of enterprises of the building sector.

approached through SDP, a methodology and tool developed by AVE and the ADEME and recently tested in the Cambresis area.

These actions will be implemented with the support of the stakeholders engaged in the BUSLeague project. This support is shown, for example, in the workshops that were organised in April, June, and October 2021 to discuss topics like funding, upskilling strategies, the training clause, partnerships and policy coordination among others.

5.4 Ireland

The Climate Action Plan (CAP 2019) set up ambitious renovation targets. I.e., the cumulative number of buildings that are to be retrofitted to a B2 equivalent BER ($>100\text{KWhr/m}^2\text{yr}$) must increase to circa 500,000 by 2030 and 400,000 heat pumps must be installed in existing buildings. For that, Ireland has to start to upskill respective professionals, crafts people, workers and all others involved in the construction industry to fulfil this requirement. A number of actions were set out by the CAP to address upskilling to enable energy-efficient construction and to ensure the supply chain of renewables.

A significant move to energy-efficient trainings started in 2013, as part of BUSI BUILD UP Skills, the Limerick Institute of Technology (TUS) coordinated with the Irish Green Building Council (IGBC) as partner the QualiBuild project and implemented 3 main objectives, which have now been further developed across Ireland and parts of Europe.

An accredited EQF Level 6 (QQI level 7 SPA) Train the Trainer programme was established and 57 trainers in the construction Industry were trained. This programme has now been updated by TUS and is currently being piloted with Waterford Wexford Educational Training Board (WWETB) to upskill the trainers involved in apprenticeships in the fields of NZEB, circular economy and compliance with the new building regulations. 17 Trainers from 5 different ETBs are involved, with the opportunity to extend to other ETBs with financial support from SOLAS (state agency in FET).

A Foundation Energy Skills Course (FES) in low energy construction was piloted for 200 construction workers receiving 5 credits (CPD). As an option for the workers, an additional module could be completed to obtain 10 credits at EQF Level 5 (QQI Level 6 SPA). This course was developed further by TUS for WWETB as a suite of NZEB programmes (EQF Level 5):

NZEB Course	Level	Duration
Construction workers	EQF Level 4 (SPA)	100hrs total (24hrs contact)
Crafts (plasterers, carpenters, bricklayers, plumbers and electricians)	City & Guilds (EQF Level 5)	100hrs total (24hrs contact)
Site supervisors	City & Guilds (EQF Level 5)	120hrs total (32hrs contact)
Specific retrofit course	CPD	7hrs total
Fundamentals course	CPD	7hrs total
Ventilation course	City & Guilds (EQF Level 5)	60hrs total (14hrs contact)

Courses for professionals are well catered for in NZEB with many of the higher education bodies providing EQF level 6 to 8 (QQI level 7 to 9) courses and online special purpose awards at TUS. A Construction Workers Skills Register (CWSR) was also established to complement the existing Companies CIRI Register developed by the Construction Industry Federation (CIF). The

CWSR enabled individual workers to display their qualifications and skills, for building owners and clients to find competent workers at a one-stop-shop and for companies to locate suitable sub-contractors to carry out works.

Currently, there are several trainings facilitating the upskilling of NZEBs, however, the industry still needs to be incentivised to take up the trainings. Financial trainings will be required and with the introductions of the green mortgages, deep retrofitting grants and building passports, it is necessary to train and support the industry in these fields.

There are about 1.5 million residential homes in Ireland that need retrofitting. The lack of investment in skills at all levels of the construction supply chain has been identified as one of the main risks to large scale energy renovation in Ireland. To better support building professionals and construction workers who wish to upskill in energy renovation, the IGBC and TUS are developing an online self-assessment tool to help them identify their training needs and training courses available. This project is supported by SEAI under RD&D scheme.

The Renovation Register

To encourage building professionals and construction workers to upskill in energy renovation and to make it easier for all users to identify those who have upskilled in energy renovation, the project partners recommend setting up two registers: a register of building professionals who have upskilled in energy renovation (Renovation Advisor) and a register of construction workers who have upskilled in energy renovation (Renovation Installers). To enable professionals and workers to upskill and become an advisor or installer, the BUILD UP advisor app was developed in collaboration with ISSO and will be further developed in BUSLeague.

The IGBC is also working on the development of a one-stop-shop as part of the Horizon 2020 funded Turnkey Retrofit project. Qualified professionals should provide retrofit advice as part of the one-stop-shop model to: 1. give impartial advice for a tailor-made solution; 2. provide a holistic overview that prevents lock-in effects; 3. devise solutions with a staged approach to suit homeowners' budgets and timing; and 4. answer questions and give options to homeowners, thereby instilling confidence in them. The register would facilitate this approach.

To outreach to the majority of the workforce, the focus of training courses in Ireland is set on micro-learning for construction workers and SMEs in energy efficiency, circular economy and digital skills; additionally, promotional short training videos will be carried out in cooperation with hardware stores and training centres.

BIMzeED

The Erasmus+ BIMzeED project has developed 12 online Learning Units (LUs) with approximately 8hrs of contact time and 24hrs of self-study with assessments. The LUs demonstrate how BIM/digital tools can assist with achieving cost-effective NZEB construction for various stages of the construction process (design and installation of building fabric and services, energy simulation and facilities management) and are aimed at different cohorts depending on the topic. The LUs are piloted at 400-500 learners and 120 trainers/educators with the intention that the LUs can be used in a flexible and innovative way; stand-alone, be grouped together (EQF level) or be integrated into existing curricula.

The H2020 BIMCert project also developed short micro-online trainings on the use of BIM for NZEB construction. Both of these projects enable the learners to build their own training plan and upskill.

Further training topics in connection with the renovation of buildings is the focus on the usage of green materials and renewable energy sources (e.g., heat pumps).

HP4ALL

Two of the objectives include:

- To design and pilot the HP skills competency & excellence framework to support mutual recognition of HP skills
- To increase the number of skilled workforces across the HP design, operation and maintenance value chain, with a specific focus on the engagement of SMEs. Delivery of a

range of interventions (training, guidelines, campaigns, technical sales training, policy recommendations, etc.) addressing critical skills barriers in Ireland, Spain and Austria.

The HP4All Knowledge Hub will be a source of information that will support end-users, but also specifiers and installers, on best practice in relation to HP installations, and specific skills needs. Materials to be available are: best practice guides, case studies, technical reports, procurement guides, webinars and others.

GUPP, Life Level and Circular Life

The significant changes to the green procurement process with regard to "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life-cycle when compared to goods, services and works with the same primary function that would otherwise be procured" (Communication (COM (2008) 400) will help to bridge the skill gap in stimulating the transition to GPP⁹ in the construction industry by developing:

- GUPP, a green handbook guidelines, and a GUPP capacity building programme with 40 hours of blended training¹⁰.
- Life Level and Circular Life – spreading the awareness about green building principles and promotion of environment protection and energy efficiency values with alignment of Europe's leading green building certification schemes¹¹

Construction Blueprint

The Sector Skills Alliance Erasmus+ Construction Blueprint will facilitate the trainings in all the aforementioned projects and, additionally, is compiling and providing online trainings via an OER¹² platform organised by TUS. These trainings are to be provided for free to anyone interested to enable upskilling in energy efficiency, circular economy, digitalisation and health & safety. Additionally, 3 curricula will be developed to be piloted and translated in 11 countries at VET centres with mutual recognition at EQF levels. In Ireland, it is expected to develop the NZEB suite of trainings for piloting in other countries and specific curricula depending on national priorities.

All NZEB materials and BIMzeED are available in English.

In Ireland, a blend of measures to stimulate demand for training, materials, equipment and energy-efficient buildings knowledge will be aided with hands-on and practical upskilling.

Working alongside DIY/manufacturers, training centres, policy makers, local authorities and SMEs will ensure the implementation of these measures.

The Technological University of the Shannon (TUS) have been in contact with hardware stores, suppliers and training centres to develop a strategy for upskilling staff and customers. This entails stores setting up training/awareness areas which will display products, installation models and information to advise customers about products and NZEB training. This will include an interactive screen with additional information regarding training that customers and visitors to the store may use.

TUS have carried out virtual and socially distanced face-to-face meetings with suppliers and stores:

- Chadwicks: 50 hardware stores
- Grafton group: 35 hardware stores
- Grant Engineering: supplier of heat pumps
- Daikin: supplier of heat pumps

⁹ Green public procurement (GPP)

¹⁰ https://ec.europa.eu/environment/gpp/buying_handbook_en.htm

¹¹ <https://lifelevels.eu/about/>

¹² Open Educational Resources (OER)

- Ecological Building Systems: supplier of airtight and wind tight building products and insulation
- Partel: supplier of airtight and wind tight building products and ventilation systems
- Isocell: supplier of airtight and wind tight building products
- Aereco: supplier of ventilation becoming more common
- Nilan: supplier of MHRV¹³ & integrated heat pumps
- St Gobain: supplier of airtight and wind tight building products and insulation

These discussions have resulted in a developing strategy involving training of staff at hardware stores by suppliers. This will consist of hour-long sessions for 1-3 staff so as not to take too many sales staff from the counter at any one time.

Grant Engineering are currently delivering this training and advised that over 40 hardware staff have been trained; this began with their mobile training unit at a hardware store in Portlaoise on Sept 29th.

Tom Delaney at Telfords was the first BUSLeague appointed energy champion and will be working with TUS in the future. Other suppliers are currently scheduling training to be delivered in January.

The meetings with Chadwicks have resulted in a plan to train at least one staff member in each store in NZEB Fundamentals, Retrofit and Ventilation. The stores will also add interactive screens in the Eco-Centres, that TUS have had some input into, which will present short videos of NZEB practises. Additional information with video clips of various durations will be able to be accessed.

There will be information on the screen from suppliers about training of and courses with various methodologies of installation. Some of these will also be certified CPD courses.

The training boards are distributing posters and brochures of their NZEB course and will create content to upload onto the interactive screens, which will direct anyone viewing the screen through a QR code to the centres that are currently delivering NZEB training. There are currently two in Ireland and more training boards are developing training centres, which will be updated on the site making the QR code site show the nearest locations to the hardware stores to customers that are viewing the screen.

There are also discussions about mobile training rigs which can visit hardware stores and sites.

Discussions with one large builder's merchant in Ireland have led to a proposal that the store will deliver training to customers such as builders and trades in an early morning session with refreshments and spend the rest of the day training staff. This would, we believe through word of mouth and positive feedback, lead to this type of training gaining momentum.

Additionally, TUS have also discussed adding the BUILD Up Skills app to the interactive screens allowing workers to sign up and to enable them easier access to additional trainings, develop their own training plan and promote their own skills and qualifications on a European-wide mutually recognised skills register.

This development is ongoing and will hopefully allow a Europe-wide facilitation for contractors to recruit staff and make it easier for them to find the professions they are looking for in other countries in addition to their own, which may alleviate the current industry personnel shortage.

Our other Irish partner, the Irish Green Building Council-IGBC, have developed a short online training course for bathroom retailers to ensure staff understand water efficiency and can guide consumers to make more informed choices. The training was first delivered in December 2021 to employees of a DIY store. To date, 24 employees of DIY stores/bathroom retailers have completed the training. More training courses will be delivered in 2022.

¹³ Mechanical Heat-Recovery Ventilation (MHRV)

5.5 Netherlands

In the Netherlands, collating upskilling content and resources is done mainly in the BUILD UP Skills advisor app. For courses that currently are not 'available in the open market', information about their existence, content and past experiences is available mainly in the network. Connecting the BUSLeague learning outcomes to training content available in the open market will be the strategy and challenge. Currently, most courses regarding EE skills are not underpinned with those, although we learned in the NEWCOM project that most course institutes are willing to mark the learning outcomes and descriptors they address when a qualification is provided.

Furthermore, the Dutch team wants to collaborate with training providers and corporate training centres on short e-learning courses (so-called micro-learning) in order to nudge craftsmen to the courses available.

The Dutch strategy is:

1. Do a review on the actuality of the current training supply inventoried in the BUS app NL. In this inventory, the type of content is linked to learning outcomes.
2. The NL team will use the outcome of the national stakeholder dialogues/workshops for a further matching of courses with the learning outcomes. In the Netherlands, this will be done directly in the BUS app NL and if feasible in direct cooperation with the training and content providers.
3. Based on the outcomes of the above and practical needs of stakeholders active in the National Implementation Plan (NIP), suitability for use will be further assessed in order to craft dedicated and to the point upskilling recipes and short e-learning.

In general, we expect that the following subjects will get the most support:

1. Fundamental/key EE skills needed for all workforce working on sustaining the built environment; especially when linked to examples of actual building and installation works.
2. Fundamental EE transversal skills such as: EE and digitisation, EE and quality assurance, EE and climate adaptation, EE and circularity, EE and heritage.
3. More technology-specific EE skills such as: direct current, pipe insulation, infrared heating, heat networks, fuse box optimisation (to serve electrification), NZEB ventilation, airtightness, innovations in measurement tooling (for proven performance)

The first two subjects are best linked to the EE-skills qualification. The third one will strengthen practical cooperation with stakeholders in the field, such as SMEs with the workforce who need upskilling. Therefore, in the experiments with micro-learning, the focus will be on three more technology-specific EE skills.

For these, several detailed sets of available learning outcomes will be translated into English (e.g., hydraulic balancing, airtight installation work, heat pumps...).

In the first round of national implementation, there will be one experiment addressing NZEB ventilation skills and one dealing with hydraulic balancing. With regard to construction-related topics, the focus is initially on airtightness issues.

With regard to DIY stores, the topics tend to centre on hydraulic balancing, airtight sanitary installation (e.g., toilets) and specific sustainable technologies.

In the Netherlands, cooperation between DIY stores is ongoing.

5.6 Spain

Based on the Spanish National Implementation Plan (NIP), 1,640 DIY store workers and installers will be trained. These courses will be aimed at workers and installers of the Bauhaus store located in Paterna (Valencia) and will then be replicated to other stores nationwide.

For this reason, the courses are being adapted to the needs of Bauhaus in terms of both content and modality. Even before BUSLeague, Bauhaus already organised courses for their workers and

relied on short videos with a very practical aspect (micro trainings). In the framework of the BUSLeague project, they want to expand the topics to include EE skills, which was still pending. Bauhaus have their own Moodle platform where they organise their courses. Access to the Bauhaus Moodle is restricted to Bauhaus employees who are obliged to take the courses.

IVE has extensive experience in organising courses but needs to convey the theory in a more friendly and understandable way to the Bauhaus salespeople and installers. The salespeople should learn the basics of energy efficiency and how to sensitize customers to energy efficiency. In addition, the salespeople should be able to help customers find the right workers for their projects in the future.

Moreover, the installers of Bauhaus should be trained to be able to install the products of Bauhaus optimally. The difficulty here is that the target group of installers consists of several professions, and all have to be addressed. Therefore, the challenge is to combine IVE's knowledge of EE skills applied to the construction sector with the sales strategy of a large company by upskilling its workers and installers.

Bauhaus and IVE have exchanged information on possible topics and a survey was carried out among workers and installers to find out their interest. As a result, IVE has created a series of 10 micro-trainings consisting of short videos newly recorded (5 minutes each) together with a compilation of complementary materials already existing (PDFs, links of interest, etc.). As part of the complementary material, 11 PDF documents produced in the framework of the H2020 Construye 2020 project will be added.

The table of contents of the 10 micro-trainings created by IVE is as follows:

- Introduction to EE buildings (what is EE, terms, definitions, etc.)
- How to improve EE (passive and active measures)
- User behaviour
- Insulation
- Windows
- Installations (1/2)
- Installations (2/2)
- Lightning
- Home appliances
- Renewable energies

Bauhaus is also preparing a series of micro-trainings consisting of short videos (2-3 minutes). The content is organised according to the departments of their stores: sun protection (curtains, blinds, etc.), home appliance, insulation, garden, etc. In this way, BH employees can learn about the energetic behaviour of the products they sell and advise customers appropriately.

These courses will run from December 2021 to February 2022 for Bauhaus employees in the Valencia shop and will be a pilot test.

The aim is to replicate these courses nationwide to the other Bauhaus shops.

The lessons learned will be shared at Bauhaus meetings at European level and the material will be offered for replication.



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