

# D6.4 Professional knowledge dissemination and trainings

Deliverable Report D6.4



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**P2ENDURE**

Plug-and-Play product and process innovation for Energy-efficient building deep renovation

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## Publishable executive summary

The live demonstration projects have a crucial and central place within the P2ENDURE project. Each demonstration case addresses one or more challenges of deep renovation that potentially can be solved using Plug and Play prefab systems. The demonstration case has following three main objectives:

1. realizing and measuring the success of the pilot deep renovation cases;
2. facilitating cross-learning between different projects and geo-clusters,
3. securing the broad replication potential at EU level.

The objectives on communication and dissemination of the demonstration cases will be realized within P2ENDURE by two ways:

The first way is to devise and organize professional publications, (local) events and short films, specifically dedicated to the live demonstration cases. It depends on the specific scope and objectives of each demonstration case how this communication is focused and organized.

The second way is to secure the success of the demonstration cases by setting an objective to improve the overall quality of the entire renovation process, from pre-design till operation and maintenance phase. This is done by mapping and recording the needed qualities and quality levels, the needed skills and Continuing Professional Development (CPD) to improve the overall quality of renovation. Once the skills and qualifications are mapped, specific trainings will be organized. In order to have specific, targeted and meaningful trainings a method to map the actual needs for skills, qualifications and trainings will be offered.

The use of Building Information Modelling (BIM) has a central role in P2ENDURE. In relation to quality control and trainings, BIM can be used as a universal information carrier, both for describing the needed quality levels as for the needed skills and qualifications.

For the actual realization of the quality control trainings and the use of BIM in this process synergy and collaboration will be established with other relevant H2020 projects.

## List of acronyms and abbreviations

APC: Author Processing Charges

BIM: Building Information Model

CPD: Continuous Professional Development

CSA: Coordination and Support Actions

HVAC: Heating Ventilation Air Conditioning

ICT: Information and Communication Technology

IEQ: Indoor Environment Quality

IPR: Intellectual Property Right

OA: Open Access

nZEB: nearly Zero-Energy Buildings

PnP: Plug and Play

RES: Renewable Energy Source

TCP: Technology Commercialization Platform

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# 1. Introduction

## 1.1 General context

The live demonstration projects have a crucial and central place within the P2ENDURE project. Within these demonstration cases the innovations on Plug & Play retrofitting technologies and concepts will be demonstrated, tested and validated, to provide evidence-based innovative solution for deep renovation. The demonstration cases and monitoring will be organized in direct collaboration with the involved stakeholders. Each demonstration case addresses one or more challenges of deep renovation that potentially can be solved using Plug and Play prefab systems. This should lead to a further deployment and development of these PnP concepts in deep renovation projects in Europe. Therefore, it is important within the projects' communication and dissemination strategy to emphasize the visibility and to support the promotion of the demonstration cases. The demonstration cases have the following three main objectives:

- realizing and measuring the success of the pilot deep renovation cases;
- facilitating cross-learning between different projects and geo-clusters,
- securing the broad replication potential at EU level.

## 1.2 Strategy to realize the objectives on communication and dissemination of the demonstration cases

The objectives on communication and dissemination of the demonstration cases will be realized within P2ENDURE by two ways:

The first way is to devise and organize *professional publications, (local) events and short films*, specifically dedicated to the live demonstration cases. It depends on the specific scope and objectives of each demonstration case how this communication is focused and organized. For example, site visits can be organized for stakeholders and other interested partners, both on a local level as on a regional or national level.

The second way is to secure the success of the demonstration cases by setting an objective to *improve the overall quality of the entire renovation process*, from pre-design till operation and maintenance phase. This is done by mapping and recording the needed qualities and quality levels, the needed skills and Continuing Professional Development (CPD) to improve the overall quality of renovation. Once the skills and qualifications are mapped, *specific trainings will be organized*.

In order to have specific, targeted and meaningful trainings, P2ENDURE will offer an approach to map:

- the involved professions and trades;
- the definition of the quality levels;
- the needed skills and qualifications to achieve and realize these quality levels in practice;
- the skill gaps between the present and needed skills and qualifications of the workforce;
- the needed trainings for upskilling (if a skill gap is mapped).

### 1.3 The role of BIM

The use of Building Information Modelling (BIM) has a central role in P2ENDURE. P2ENDURE deploys BIM for lifecycle information management. This is operationalized through a BIM data and simulation platform in combination with user-friendly asset management software for deep renovation projects. Using the generalized use case BIM, P2ENDURE allows customizing renovation options through a parametric design modeller. The integration of BIM and the parametric modeller will enable a participatory design process involving the whole value-chain, involving clients, end-users, and all suppliers. To a further extend in this approach BIM can also be used as a universal information carrier, both for the needed quality levels as for the needed skills and qualifications.

One of the major side benefits of this approach is that quality control and training will contribute to bridge the performance gap between design, realization and in-use. This can be supported by using a BIM enhanced workplace learning environment.

P2ENDURE will use existing training and skills mapping methodologies (such as developed in the H2020 PROF/TRAC project) and lessons learned from building errors-database developed in recent H2020 projects (such as developed in the H2020 INSITER project).

Training activities might also become part of the business workshops with the Technology Commercialization Platform (TCP) members.

## 2. Professional publications, events and short films

### 2.1 General context

One of the six main objectives of P2ENDURE is to disseminate and valorise knowledge and results from P2ENDURE along with establishing and strengthening synergies with other EU and national innovation activities. This objective is oriented towards awareness-raising for deep renovation, and in direct support of market upscaling and replication strategies. In this sense, dissemination is carried out on different levels.

On a general level, professional and scientific publications will be written during the timespan of the project, and will be presented at workshops, conferences, seminars as well as shared on the public website. This type of dissemination is reported in the Deliverable Report D6.3: Scientific publications, presentations and academic trainings.

On a more specific level, professional publications, (local) events and short films, will be devised and organised specifically for the P2ENDURE live demonstration cases. However, the results and impact of these activities on demonstration case scale can also be used for a broader dissemination on European level, for example as a part of the activities as to be reported in D6.3.

### 2.2 Overview of specific activities per demonstration case

In total, ten demonstration cases will be addressed, with a different building functions, technologies and concepts to be applied and renovation strategies to be followed. For each demonstration case the dissemination and communication means and strategy can be tailor-made and specifically be dedicated to the case. The specific activities for each demonstration case are recorded in following table (template to be used for all demonstration cases proposed within P2ENDURE):

Demonstration case: 1. Transformation of historic hospital to dwellings in Palmanova, IT							
Specific objectives:							
Type of activity - publication - event - film -other	Responsible partner(s)	Date	Title	Short description	Type of addressed audience	Size of addressed audience	Links



## 3. Training

### 3.1 The training concept in P2ENDURE to enhance the overall quality

Nearly Zero Energy Building (nZEB) renovation needs an enhanced systematic approach for the quality control of the entire process. This is the first prerequisite to reduce the gap between designed (predicted) and actual performances of buildings, both in terms of energy efficiency and in indoor environmental quality.

There are two important boundary conditions for this enhanced quality control approach:

- Firstly, the quality levels need to be precisely defined, and the consequences of these quality levels need to be communicated and explained, to all relevant partners in the renovation process, but especially to the client.
- Secondly, there is the need of a fully qualified and equipped workforce, capable to implement, execute and perform all the necessary labour actions with a full understanding of the responsibility of their own profession and actions, as well as the relation with the other involved professions and actions within the value chain.

Within the Build Up Skills program (IEE) and Construction skills program (H2020) several projects have worked on methodologies to create and standardize the needed qualifications and a range of learning tools to unlock and implement these qualifications.

A specific feature in P2ENDURE is that, to be future-ready, all subject specific qualifications will be enriched with the skills and competences needed when performing a job in nZEB renovation by using BIM. BIM is used as an information carrier for quality control and need trainings and upskilling. By using standardized methodologies the created qualifications will be transparent and comparable between the P2ENDURE partners from the different EU member states. This will also facilitate and provide a mobility between the different P2ENDURE partners and EU mobility in general.

P2ENDURE engages some new and challenging opportunities now to make a step forward in this process. P2ENDURE will use the results and successes of the Build Up Skills and (now running) Construction Skills projects. These projects offer the necessary building blocks in training, CPD, methodologies for skills mapping for all professions and for levels involved in nZEB renovation skills. New means such as BIM offer the opportunity to implement these results in a BIM-enabled workplace learning environment. This will be done in a process that is:

- Cross-Trade: with a multidisciplinary approach throughout the entire value chain of the buildings sector.
- Cross-EQF-level: addressing both blue collar workers, middle and senior level professionals involved in the demonstration cases
- Cross-Time: by using a flexible qualification methodology so that new innovations and uses of technologies within the demonstration cases can be addressed;
- Cross-Value: by improved appreciation of the end user's needs including the quality of indoor environment (thermal and visual comfort, acoustics, air quality, etc.), in an improved operation and maintenance by closing the learning loop using BIM as information carrier.
- Moreover:
- Cross-Country: by setting up a mutual recognition scheme of qualifications among different P2ENDURE countries, but by leaving room for specific roles and uses of technology in each country.
- Cross-size: from SME to large enterprises; this can be based for example on regional or local experience centres or BIM-Hubs.
- Cross-Project: by using BIM as a learning environment, to facilitate and enable the learning flow, both between the demonstration cases and their experiences as from these case to outside the project.

The overall approach of the cross-trade and cross-level training of involved professionals/workers in the P2ENDURE demonstration cases is to link and connect available methodologies of mapping of skills, training schemes and qualifications schemes to the different professions involved in the different phases of the retrofitting process in order to achieve an overall improved quality for nZEB renovation.

Therefore local trainers and learners will be offered a range of tools for creating a fully qualified and equipped workforce, capable to implement, execute and perform all the necessary labour actions with a full understanding of the responsibility of their own profession and actions, as well as the relation with the other involved professions and actions.

The specific training in P2ENDURE will address all process phases in a cross-trade and cross level multidisciplinary approach, strengthened with hands-on and BIM-enhanced workplace learning tools.

### 3.2 Example of quality control and training over the project phases

Quality control, quality levels, professions and trades involved as well as necessary trainings for upskilling, over the project phases of the retrofitting process, can be expressed in a so called Quality and Skills Matrix.

In the following table a simplified example is given of a Quality Control Matrix addressing several quality control aspects for ventilation systems.

Quality Control Aspect	PROJECT PHASE				
	I programme (pre-design)	II design	III elaboration	IV realisation	V operation
<b>0 general</b>	I.0 ToR building	II.0 Boundary conditions	III.0 Boundary conditions		
<b>1 organisation</b>					
<b>2 communication</b>	I.2 Information exchange between client, architect and designer (engineer) on specifications and quality levels	II.2 Information exchange between client, architect and designer	III.2 Information exchange	IV.4 Information exchange between designer and installer on installing instructions	
<b>3 requirements and quality levels</b>	I.3 IAQ thermal comfort outdoor noise installation noise energy user aspects reliability sustainable building	II.3 quality supply air thermal comfort fire safety airing air tightness	III.3 fans energy use fans ventilation grilles ducts dampers fire dampers HRU	IV.3 installing demands	V.3 operation maintenance
<b>4 means</b>	I.4 air tightness classification ventilation balance openings noise reduct. facade energy occupants impact maintenance- reliability costs	II.4 capacity duct design air resistance calcul. execution types air quality grilles installation noise cross talk outdoor noise fire safety airing air tightness energy use	III.4 selection of fans selection grilles - facade - wall, ceiling selection ducts selection fire dampers selection HRU building technical measures for noise control	IV.4 installing guidelines balancing procedures	V.4 operation instructions maintenance
<b>5 purchase</b>	II.1 Training provider for architect, engineer (courses)			II.4 Training provider for installers (courses or trainings on site)	II.5 Training provider for installers or O&M specialists
<b>6 time</b>					
<b>7 finances</b>	I.7 costs				
<b>8 documentation</b>	I.8 reporting	II.8 reporting	III.8 specifications	IV.8 Hand-over documents	V.8 O&M manuals
<b>9 experience</b>					
<b>Added quality control aspects on training</b>					
<b>10 professions and trades involved, roles</b>	client, building manager mechanical engineer, architect	mechanical engineer, architect BIM specialist	mechanical engineer, installer BIM specialist	Installer BIM specialist	Building manager. Installer/specialist
<b>11 required skills level</b>					
<b>12 training</b>					

Such kind of matrix will be further elaborated for:

- the professions / specialisms and EQF levels involved in each phase;
- the required skills, competences and end-terms for the addressed technologies and technology components;
- the available trainings.

BIM can be used as a universal carrier for this information, with the extra possibility to link this with the live demonstration projects, documented in BIM.

### 3.3 Collaboration and synergy with relevant BUS, CS and other H2020 projects

Establishing and strengthening synergies with other EU and national innovation activities is embedded in one of the P2ENDURE project objectives. It aims for training industrial partners and local construction firms to implement P2ENDURE approach and solutions within potential projects at local and EU level by engaging a synergy with training projects and Coordination and Support Actions (CSA) in Horizon 2020, especially with the Build Up Skills programme. It also aims to educate students and young professionals in advanced deep renovation and continuous development and improvement of P2ENDURE solutions (as part of D2.3). Especially for the case-specific training activities synergy and collaboration is envisaged with the Build Up Skills projects (IEE) and Construction skills projects (H2020). Where the Build Up Skills projects are limited to a national level and only addressing blues collar workers, (most of) the Construction Skills projects are addressing a European level and are focusing on white and blue collar workers. Nevertheless, some of the national BUS pillar II projects have very interesting and relevant outcomes for training and upskilling workforce, not only limited to one specific country. The recent contracted projects in the EE14-2016-2017 Construction Skills call have also as a special focus the training on and/or deployment of BIM. In the next table a number of possible relevant projects are given:

Project	Summary	Usable output and synergy with P2ENDURE
<b>H2020 EE4-2014 PROF/TRAC</b>	PROF/TRAC overall aim is to develop and maintain an Open Training Platform for Continuing Professional Development for professionals in the building sector. This platform addresses technical experts, engineers, architects and building managers and is endorsed by the EU umbrella organisations REHVA, ACE and Housing Europe.	PROF/TRAC skills mapping methodology PROF/TRAC database for: - access to available training materials in EU - using the PROF/TRAC open Training platform for further exploitation and as repository of results Using the PROF/TRAC members REHVA, ACE and Housing Europe as stakeholders, representing the engineering and architects branch and social housing sector PROF/TRAC is only addressing senior and medium professionals (not blue collar workers)
<b>H2020 EeB3-2014 INSITER</b>	INSITER aims to eliminate the gaps in quality and energy-performance between design and realisation of buildings with prefabricated components. The key innovation is an intuitive and cost-effective Augmented Reality (AR) system that connects the virtual model based on Building Information Model (BIM) and the physical building in real-time.	The visualization of the building actual performances, the simulation of the building performances, the immersive and interactive AR system, for concurrent distributed building construction design and manufacturing. Lessons learned in connecting learning tools to BIM-models.
<b>H2020 EE14-2016 BIMplement</b>	The overall aim of BIMplement is to achieve an improved quality for nZEB construction and renovation by setting up large scale training, Continuous Professional Development and BIM-enhanced qualification schemes, addressing the entire value chain in a cross-trades and cross-level multidisciplinary approach, strengthened with hands-on and BIM-enhanced workplace learning tools by following objectives: 1. To improve the overall quality of renovations and new constructions, based on a BIM-enabled workplace learning, addressing the entire process phases in a cross-crafts multidisciplinary approach. 2. To create a new generation of professionals and craftsmen, equipped and enabled by BIM skills, to enhance the overall quality of construction and renovation across the entire process. 3. To foster interactions between different trades and professions enabled by a flexible qualification, certification and accreditation methodology for implementing BIM as a workplace learning environment. 4. To sustain the qualification and training schemes a replication and exploitation strategy will be developed and validated.	The use of BIM as information carrier for quality levels and the required skills, cross level and cross trade. Both addressing blue and white collar workers



<p><b>H2020 EE14-2016 NEWCOM</b></p>	<p>NEWCOM addresses challenges of raising building quality that supervisory authorities are facing today in order to achieve the European and national climate protection targets for 2020 and the implementation of the nearly zero-energy buildings standards. NEWCOM focuses on the development of missing qualification and certification schemes for blue collar workers and building professionals who inspect and control the most relevant qualities with a specific focus on mutual recognition.</p>	<p>Qualifications and certification schemes for nZE retrofitting</p>
<p><b>H2020 EE14-2016 NET-UBIEP</b></p>	<p>NET-UBIE proposes BIM Qualification Models integrated with energy competences to widespread a better comprehension of energy issues along all the value chain of building industry so that both existing and new building will have better energy performances. The definition of the BIM Qualification Models will pass through the identification of specific energy BIM competences for each of the above target needed to implement BIM models during the whole building life cycle. During the project the integrated BIM Qualification will be validated by stakeholders thanks to the delivering of different training activities addressed to at least six BIM Professional Profiles: BIM Manager, BIM Evaluator, BIM Coordinator, BIM Expert, BIM facility manager, BIM user. Once the schemes will be validated, they will be proposed for standardization to find a broader acceptance at European and international level through regulatory organizations (CEN / ISO).</p>	<p>BIM qualification models and BIM competences for different trades/roles. Use of the NET-UBIEP network</p>

### 3.4 Trainings performed per demonstration case

The specific training activities for each demonstration case are recorded in following table (template to be used for all demonstration cases):



<b>Demonstration case: 1. Transformation of historic hospital to dwellings in Palmanova, IT</b>							
<b>Specific training objectives:</b>							
<b>Type of training</b>	<b>Date</b>	<b>Responsible partner(s) and/or external training provider(s)</b>	<b>Short training or course description</b>	<b>Skills mapping performed Y/N</b>	<b>Type of addressed trainees (profession, trade)</b>	<b>Number of trainees</b>	<b>Links</b>



## Conclusions

This deliverable presents a framework for the professional knowledge dissemination and trainings to be applied for the P2ENDURE project. This document gives guidance for the consortium partners on:

- How to organize and record professional publications, (local) events and short films, specifically dedicated to the live demonstration cases; and
- How to organize more specific, targeted and meaningful trainings by mapping the actual needs for skills, qualifications and trainings to enhance the overall quality of the live demonstration cases.

Based on the objectives for dissemination and the policy, the final scope is to raise awareness of the work, activities and outcomes of the P2ENDURE project and specifically to emphasize the visibility and to support the promotion of the demonstration cases.

The central idea is that P2ENDURE partners can deploy several dissemination strategies and activities, which can be organized as tailor-made events to reach all relevant stakeholders. These activities include among others, site visits, local seminars and workshops, promotion events, publish articles and papers. Training and upskilling of both professionals and workers, involved in the renovation process of the demonstration cases can be done in an effective and targeted way by using skills mapping methodologies, as developed in H2020 projects such as PROF/TRAC, or can be organised, if preferred, in a more general way. However, as the use of Building Information Modelling (BIM) has a central role in P2ENDURE, it is recommended that trainings will be organised in a targeted way, using BIM as a universal information carrier, both for the needed quality levels as for the needed skills and qualifications.

The P2ENDURE dissemination and communication plan is a dynamic process, which implies that regular updates should be made as the plan is subject to changes based on newly available data. It is expected that all consortium members will contribute to this process and each partner will explore further opportunities. Measures will be taken by all consortium members to collaborate in other activities and disseminate know-how; this will be done in collaboration with the Deliverable Report D6.3: Scientific publications, presentations and academic trainings. The P2ENDURE dissemination plan is considered a constantly evolving process which comprises the update of the project's activities and trainings, the gathering of publishable results from the rest of the partners, and any other important activities reinforcing the efforts to disseminate the project's outcomes, according to targeted results provided in this plan.

This report contains templates to describe and record the organized dissemination activities and trainings for each demonstration case.