SKILLS
INSTRUCT
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CONSTRUCTION

Awareness raising methodology towards energy efficiency vale chain

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D3.4 Awareness raising methodology towards energy efficiency value chain

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Revision and history chart

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Glossary

Acronym	Full name
CA	Consortium Agreement
EC	European Commission
EASME	The Executive Agency for Small and Medium-sized Enterprises
GA	Grant Agreement
PC	Project Coordinator
WP	Work Package
TL	Task Leader
DoA	Description of Action
PSC	Project Steering Committee
SQM	Scientific and Quality Manager
DEC	Dissemination and Exploitation Committee
KOM	Kick-off meeting
ASM	ASM – Market Research and Analysis Centre
VTT	Technical Research Centre of Finland
LIST	Luxembourg Institute of Science and Technology
RIL	Finnish Association of Civil Engineers
CU	Cardiff University
R2M	Research to Market Solution France
DTTN	Distretto Tecnologico Trentino
ENEFFECT	Center for Energy Efficiency EnEffect
GER	General Exploitable Result
AB	Advisory Board
PM	Person month
M	Month

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1. Executive summary

Through T3.4 the project team aims to identify schemes for new partnerships with key actors from the construction supply chain which would enable energy-related skills to be valorised. To do this, this deliverable reports on the **identification of the value chain associated with energy efficiency in buildings,** as well as the **description of partnerships** already put in place in various European countries with focus on the energy skills concerns.

The mechanisms behind the energy skills construction supply chain are complicated to figure out. They include many stakeholders and their relationships. To better illustrate the methodology and tools presented, the context of Poland is chosen. In INSTRUCT project, the Demonstration 3 takes place in Poland and is linked to the task 3.4 reported in this deliverable.

A pragmatic sketch of the value chain is delivered in this task, as presented in Figure 1 below. It emphasizes the key stakeholders involved at different level of the building project development.

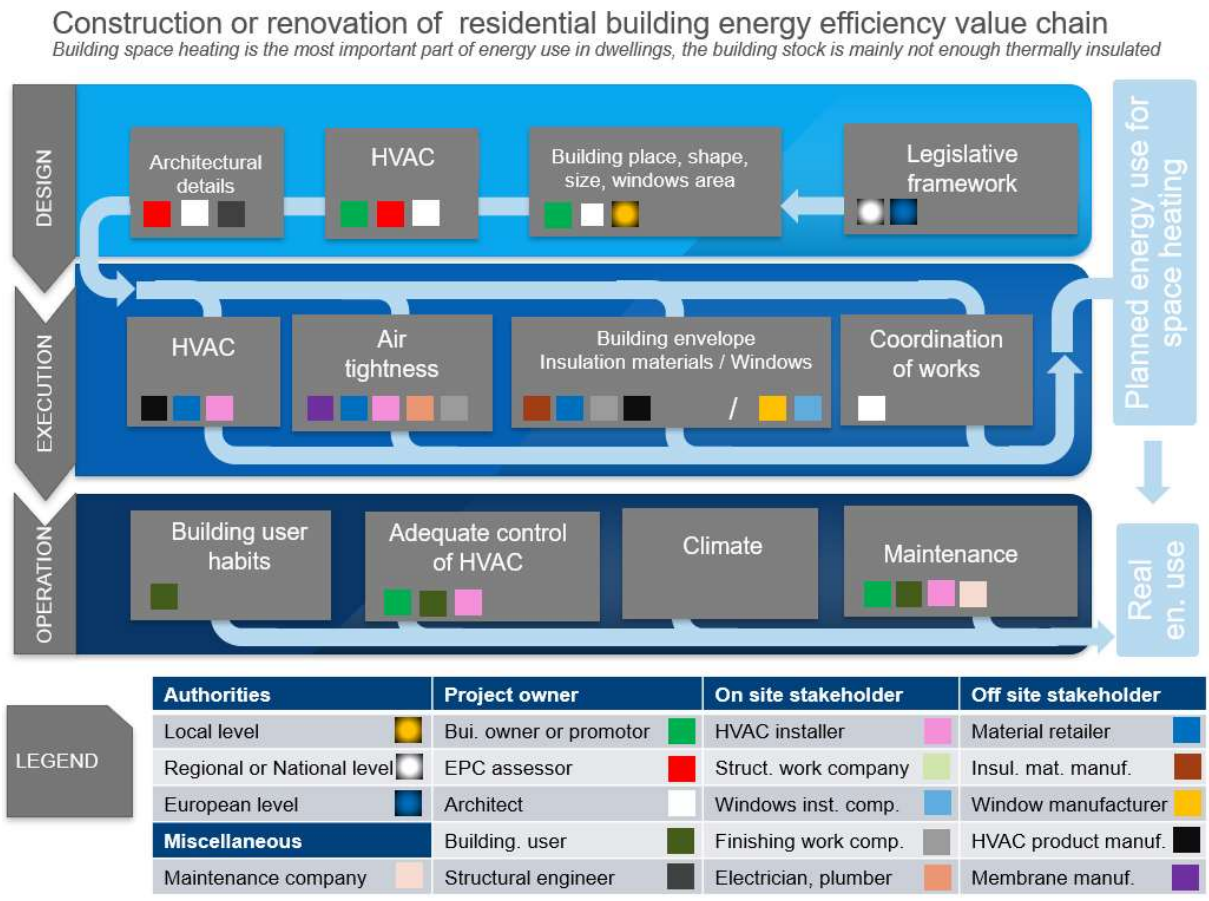

Figure 1: Construction or renovation of residential building energy efficiency value chain

This enables the choice of adequate partnerships to act on **determined energy performance related issues**. This report details the hypothesis and scope associated with the energy efficiency value chain. Some insights are showed for the **establishment of future partnerships** as well as for Demonstration 3 context. Some crucial aspects are pointed out for the establishment of such partnerships, including:

- To raise awareness of stakeholders on their impact on building energy use;
- To strengthen the use of adequate tools in order to evaluate the impact of partnerships;
- To stress the essential role of associations in the establishment of partnerships.

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2. Context

Establishing partnerships and raise awareness of people to energy efficiency, as well as more globally to the environmental impacts, are key to build and operate low impact buildings. The identification of the different stakeholders of the construction supply chain, i.e. producers of material & equipment, retailers and DIY, enable a better understanding of the sector. This is to be extended to the energy impact value chain, the idea is to find out the impact of the various stakeholder on the energy use of buildings. Ultimately, the energy-related skills to be enhanced and more widely spread can be identified. A deep knowledge of the stakeholders, their relationship, needs and constraints are crucial to address the skills gap, devise on the adequate trainings and advise on partnerships proposals.

2.1 Energy efficiency supply chain context

The environmental impact of buildings is a significant part of the total human impact on the planet, this has not to be demonstrated anymore. Besides, the building sector impact is spread between different building phases (construction, operation, dismantling) as well as different uses over the lifecycle (embodied impact of materials, energy for space heating, for domestic hot water, miscellaneous electricity consumption). To point out the most impactful sensitization and partnerships possibilities, we must dive into the energy use of buildings in Poland. As a starting point, the following statement is coming from BuildUp project (BUILD UP 2016): "*In Poland, the building sector is responsible for 42% of the total energy consumption and up to 30% of this energy is consumed by the residential sector".*

Firstly, a selection is made among the kind of buildings, to reach those with the greater energy use. In 2016, the Buildings Performance Institute Europe (BPIE) published a status report on financing building energy performance improvement in Poland (Staniaszek & Firlag 2016). Both non-residential and residential buildings have high energy use compared to other European countries. Both the number of residential buildings and the energy carrier drives to focus on this kind of building. On the one hand, around 6 million residential buildings are present compared to 300 000 non-residential buildings (Staniaszek & Firlag 2016); on the other hand, the main used energy source of residential building space heating is coal which is a very pollutant fuel. This can be seen on Figure 2: Fuel share of residential heating in Europe (Attia et al. 2022). Moreover, the Polish buildings have an annual energy consumption per m² of 200 kWh on average, meaning they are in top five of energy consumers in Europe (Bazazzadeh et al. 2021).

Secondly, a selection of the energy use must be done. The energy uses in a household are namely space heating, domestic hot water, cooking and lighting + electrical appliances (Statistics Poland, 2019). Cooling of households is not spread due to cold climate in Poland. The energy end use in households in Poland is presented in the next table. This leads to the choice of space heating for having a higher impact.

Table 1: Energy consumption in households in Poland (Statistics Poland, 2019)

Energy use	Share [%]	Total end energy [TWh]
Space heating	65.1	150

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Water heating	16.6	38
Cooking	8.5	20
Lighting and electrical appliances	9.8	23
TOTAL		231

In addition, the observation of Figure 2: Fuel share of residential heating in Europe (Attia et al. 2022)gives a tip for assessing the energy efficiency supply chain; coal is burnt in more than 60% of households.

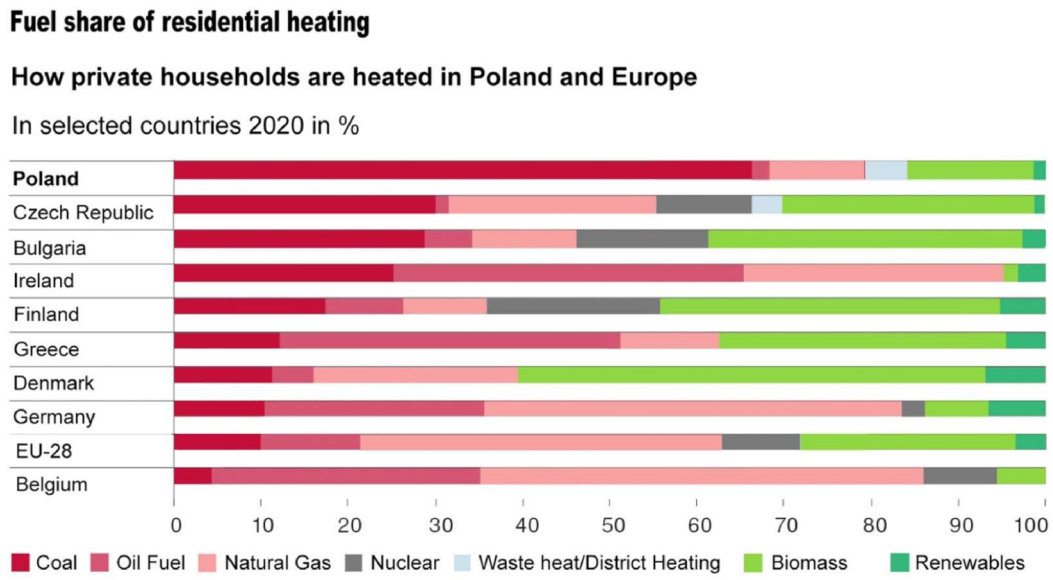

Figure 2: Fuel share of residential heating in Europe (Attia et al. 2022)

The value chain of energy efficiency presented in the next paragraph focuses on space heating energy use in residential buildings. This is considered as the field where a better awareness / partnership / training would have a strong impact.

2.2 Value chain of energy efficiency

A value chain is describing the full chain of a business's activities in the creation of a product or service. The service here is clearly the **building energy efficiency**, it involves energy use, energy efficiency for household space heating, and surely involves many stakeholders. The following identification concentrates on the stakeholders, their relationships and their involvement in a building project lifecycle as well as in the technical topics.

A scheme of the key elements influencing energy efficiency is presented in Figure 3. It shows in a very general manner the elements influencing the building energy efficiency in Poland. As one of our objectives is to raise awareness, this representation is a basis on top of which the aim is to identify the stakeholders, their relationships, and the project stages when they have significant impacts.

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Figure 3: Key elements influencing energy efficiency in Poland (Attia et al. 2022)

A listing of all stakeholders has been carried out, together with their involvement stage and the other stakeholders directly affected are being addressed. This work led to the "Energy efficiency value chain" scheme (Figure 1) detailing the whole value chain for a residential building specific project. The objective of the scheme is to have an overview of the whole value chain and to understand the relationships between the stakeholders.

The architecture of the scheme is defined as follows:

- The traditional building phases are represented in horizontal, from design to construction and then operational phase,
- The grey rectangles represent the several elements impacting the space heating energy use,
- On the right side, a distinction is made between the planned energy use and the real energy use. The blue arrows link the elements associated this those two items,
- The small, colorized squares are related to the stakeholders. For each *grey* element, some stakeholders are involved. The stakeholders are sorted as presented in the legend, this helps to know who the project owners are, who will go on site, …

The scheme proposed allows to isolate one stakeholder and highlight the links he has with other stakeholders. An example is proposed for the architect in Figure 4, allowing to emphasise the elements and the other linked stakeholders.
This tool illustrates the possible partnerships making sense. Moreover, it supports a clearer view of the boundaries of each stakeholder.

2.3 Architect's perspective

In Figure 4, the energy efficiency value chain scheme is used to highlight the various activities and construction elements in which architects are directly involved and have a high impact on energy efficiency. Those are logically focused on design phase, while the coordination of the execution is also evidently tackled.

The figure highlights the important collaboration expected amongst:

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1. **Architects and building owners or promoters at design stage**, with a particular importance of interactions with the authorities at local level. Such partnerships allows for instance the implementation and compliance to regulations at local level (e.g. municipality), while making sure the architectural project delivers the maximum efficiency while respecting the applicable regulations.
2. **Architects, building owners and EPC assessors for the design/selection of HVAC systems at design stage**. This partnership refers to the choice of heating and ventilation systems, for instance mechanical ventilation system vs. passive ventilation approaches, while making sure the energy performance is adequate with regards the EPC assessment.
3. **Architects, EPC assessors and HVAC products manufacturers**. This partnership refers to the making of architectural design choices while considering the energy efficiency impacts, such as thermal bridges.

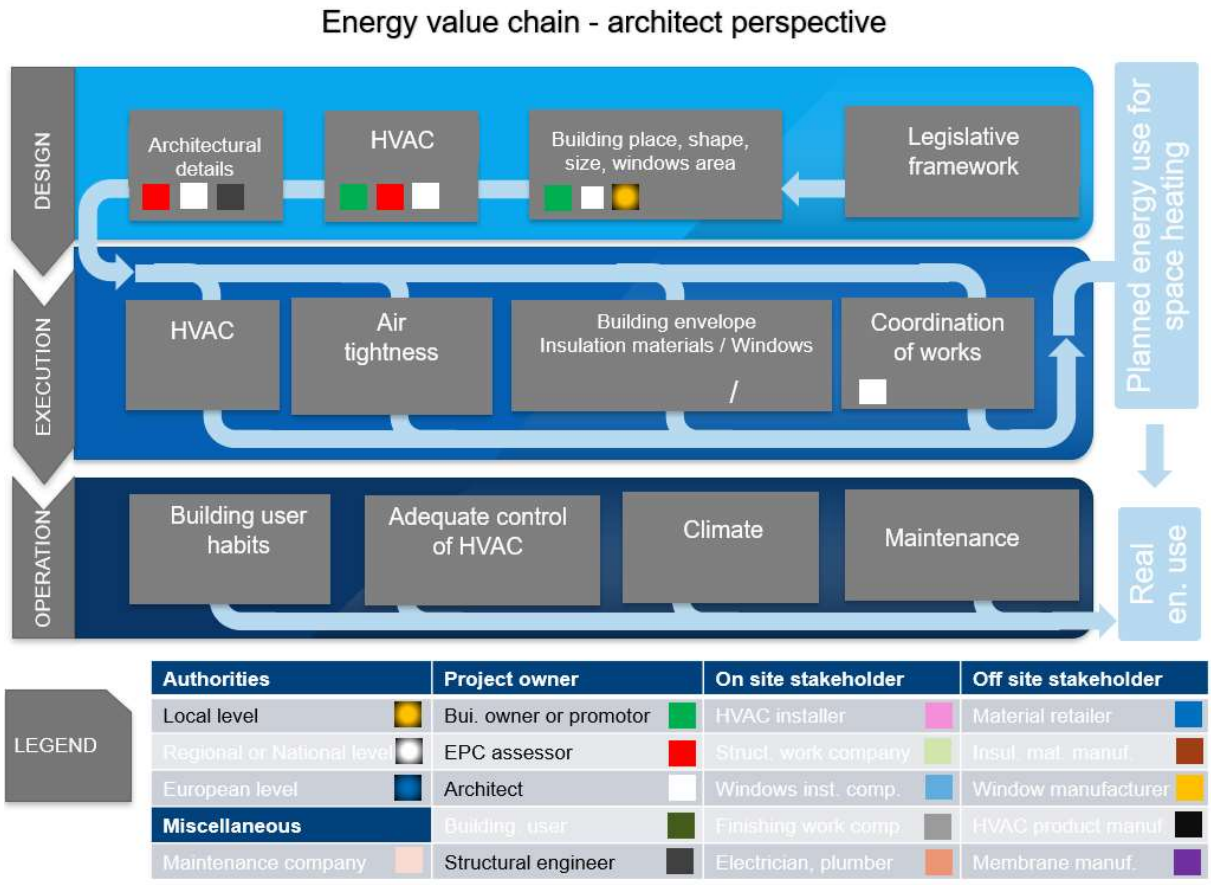

Figure 4: Construction or renovation of residential building energy efficiency value chain the architect perspective.

2.4 The essential coordination of works at execution stage

As highlighted in Figure 4, the energy efficiency is highly impacted by the construction stage, where in particular the coordination of works is essential to ensure a smooth installation process as well as rigorous quality control. The following Table 2 focuses on the expectations related to coordination and significantly impacting the performance.

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Table 2: Explanation of "coordination of works" feature

Energy sensitive work to coordinate adequately (non-exhaustive list):
Air tightness at interfaces (window/wall or wall/roof …)
Adequate storage and mounting conditions of insulation material (mainly avoid humidity)
Air tightness holes due to HVAC, plumbing, electricity works
Adequate insulation material for HVAC system
Adequate materials planed versus installed
Quality control of materials and works (especially finishing works)
Appropriate sequence of works (e.g. tiles after heated floor)

2.5 Limitations

When proposing this Energy Efficiency Value Chain, the new buildings and deep renovations are considered. The minor renovation works undertaken by building owners without the help of professional companies is intentionally removed from scope. This discards de facto the DIY sector.
The previous deliverable D2.1 (Evidencing the correlation between training and energy efficiency) emphasizes the importance of skilled professionals for building energy efficiency. So the awareness raising of building owners/users is more related to choosing the adequate company and defining adequate requirements rather than doing the renovation on their own.

The value chain scheme is intentionally related to projects without MEP engineer (Mechanical, Electrical and Plumbing), meaning small residential projects included. For bigger projects, some new stakeholders would be added to the scheme: MEP engineer, quantity surveyor, technical control office, dedicated project manager, … There is a limited number of big projects as the share of single-family houses is >90% of the total residential buildings (Staniaszek & Firlag 2016).

2.6 Other perspectives and future developments

The Energy Efficiency Value Chain presented in this document is proposed to emphasize the partnerships that could be settled. The energy use of buildings is quite more complex as stated in the previous figures, it has been investigated in some other projects such as Epanacea project[1] or IEA ECBCS Annex 66[2]. In those projects, the factors influencing energy consumption in buildings are highlighted. It reveals that the energy consumption is mainly influenced by six factors (Yoshino et al. 2016):

1) Climate
2) Building envelope characteristics
3) Building services and energy systems characteristics
4) Building operation and maintenance

[1] https://epanacea.eu/; https://cordis.europa.eu/project/id/892421
[2] http://www.annex66.org/

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5) Occupant activities and behaviour
6) Indoor environmental quality (IEQ)

The work achieved in this work package is an illustration of those factors. To have more efficient energy use, a weighted influence of those factors could be investigated to pick up the most important partnerships to put in place (Huebner et al. 2015). The occupant influence is stated as very important (Janda 2009) despite the uncertainty regarding factors influencing building energy use (Muhr 2021). The building owner has obviously impact on the "in use" energy consumption (named as habitual energy behaviour), and he determines the type of dwelling and HVAC systems that will be built (strategic behaviour). The combination of these two effects is certainly a critical point that could be investigated in future work.

2.7 Partnerships, actors, and impacts

The schematic view described in this deliverable allows identifying the potential actors available for partnerships around training. In the frame of Demo 3, the window sector in Poland is underlined. This is related to the grey box "building envelope" in Figure 1 where the manufacturer, retailer and installer are mentioned. The detailed explanation of the partnerships aimed for this demo stands in paragraph 3.

Some best practices partnerships around training have been gathered and presented in annex 1. These are coming from the INSTRUCT project partners for various countries. The partnerships presented include several actors. Among the 45 partnerships investigated, two are presented to show the data content and describe the context. The annex 1 table is divided into three parts, one for the partnerships around training where best practices of bilateral partnerships between two entities in the EU are collected (Table 3), the other one on collaborative training schemes in which Best practices of collaborative training schemes between more than two target groups (producers, retailers, installers, DIY market stakeholders and others - i.e. universities, municipalities, etc.-) are highlighted (Table 4) and the third tab is about partnerships challenges and opportunities referring to bilateral partnerships addressed in the first tab.

Table 3: Partnership around training: Roof window example in France

Partnership around training in France	
Entities involved	CAPEB (association of craftsmen) and VELUX (roof window producer)
Short description	The partnership makes it possible to continue training building professionals in the installation and promotion of energy renovation solutions for homes, those offered by VELUX.
Targeted groups	Installers of small companies
Year signed	2017
Link to online content	https://tinyurl.com/bdhu2yj2

The partnerships around training presented in Annex 1 reveal the following new opportunities for the partnerships and especially for the one highlighted in Table 3. To extend this training module, a

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worksite service is made available to VELUX customer craft businesses, via a telephone assistance line available directly from the worksite. Customer relations are also supported by this agreement: sales support tools and the development of arguments to promote VELUX products will be offered to professionals to be able to best respond to customer issues, particularly in terms of energy renovation.

The partnerships collected expose a new set of actors: the associations. The professional associations have a great role to play, they bring together some companies, pushing forward the interests of a sector rather than individuals or unique companies. In the energy value chain of Figure 1, the associations are an extension of the stakeholder they represent. An association is a partnership, here are some examples at a national or supranational level:

- RIA (Finnish Association of civil Engineers and construction architects at bachelor level)
- CAPEB (Confédération de l'artisanat et des petites entreprises du bâtiment) in France (association of craftsmen)
- REHVA (Federation of European Heating, Ventilation and Air-conditioning Associations)

Table 4: Collaborative training scheme in Luxembourg : building envelope training for blue collar workers

Collaborative training scheme in Luxembourg	
Entities involved	IFSB (Building Sector Training Institute), all construction companies in Luxembourg (which are members of CEDEC, IFSB's parent company)
Training name	Passive or low energy building envelope
Short description	The training aims to raise awareness in all energy performances topics related to building envelope. It is based on feedback and visualisation of products and their implementation.
Targeted groups	Installers of all companies, municipalities technical staff
Training duration	8h
Link to online content	https://www.ifsb.lu/enveloppe-du-batiment-passif-ou-basse-energie?lang=fr

From the collaborative training list of Annex 1, the actors of trainings are emphasized: training institutes, universities, research centres, public sector… Collaborative training schemes involve the building sector companies defining their needs and the trainer professionals providing adequate trainings. Here are some examples of training entities, those are mainly public or semi-public:

- CSTB (The Scientific and Technical Center for Building) in France
- IFSB (Building Sector Training Institute) in Luxembourg
- ENAIP Vocational Training Centre in Italy

From the previous deliverable D3.1 some challenges are revealed for some of the actors mentioned in Figure 1. Here is a summary of challenges linked to the value chain presented in this deliverable.

- For the material/equipment producers, one of the challenges is a **better training for retailers and installers** to have the real planned performance of the produced goods,
- For the retailer, among all challenges, a **better understanding of the components they sell and their combination as a complete system**,
- For the installer, challenging tasks are **better knowledge of their work** (through an adequate understanding of the installation guidelines) and **their impact on other works** (e.g. airtightness),

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- Finally, for all the actors, a **better communication on performance indicator** (labelling, environmental production declaration, cradle to cradle, circularity…) is required.

Through the work done in annex 1 about the partnership identification, some opportunities of the partnerships are emphasized, these are valuable whatever the energy efficiency value chain actors:

- **Opportunity to meet each other and exchange experiences** within the offered trainings,
- Develop **new and improve existing formal and informal links** with the statutory sector,
- Opportunity to **discuss projects and monitoring challenges with an experienced evaluator** / tutor (of the training),
- **Work-related qualifications** leading training to strengthen self-esteem and transversal competences,
- Building better relationships with employers to create **work placements and jobs for young people**,
- Opportunity for the lead organisation to access additional support and build capacity that would not have been available otherwise.

The **impact** of partnerships is not yet defined, an indicator should be settled to appreciate and evaluate the impacts. The number of people trained, or the number of projects affected by the awareness raising activities could be considered. For the partnerships detailed in Annex 1, the number of people trained is hard to reach. The following reasons are possible:

- The small number of participants makes it not a good advertisement for the partnership.
- The partnership is enclosing a large scope, making it difficult to grasp the individual impacts.
- Partnership is only a marketing tool, with no clear structure nor concrete actions behind it.

3. Focus on the building energy efficiency : Poland demo (Lukasz) *focus on key actors and opportunities*

3.1 Scope of application, identification of opportunities

The following Figure 5 highlights the actors and key activities linked with the installation and performance of windows, which is a major challenge in the polish construction industry as well as in relation with energy efficiency in general.

The main aspects to be tackled are 1) the air tightness and 2) the building envelope components, insulation material and windows. As seen in the picture, several actors are concerned and the anticipation of works, as well as their good coordination are crucial.

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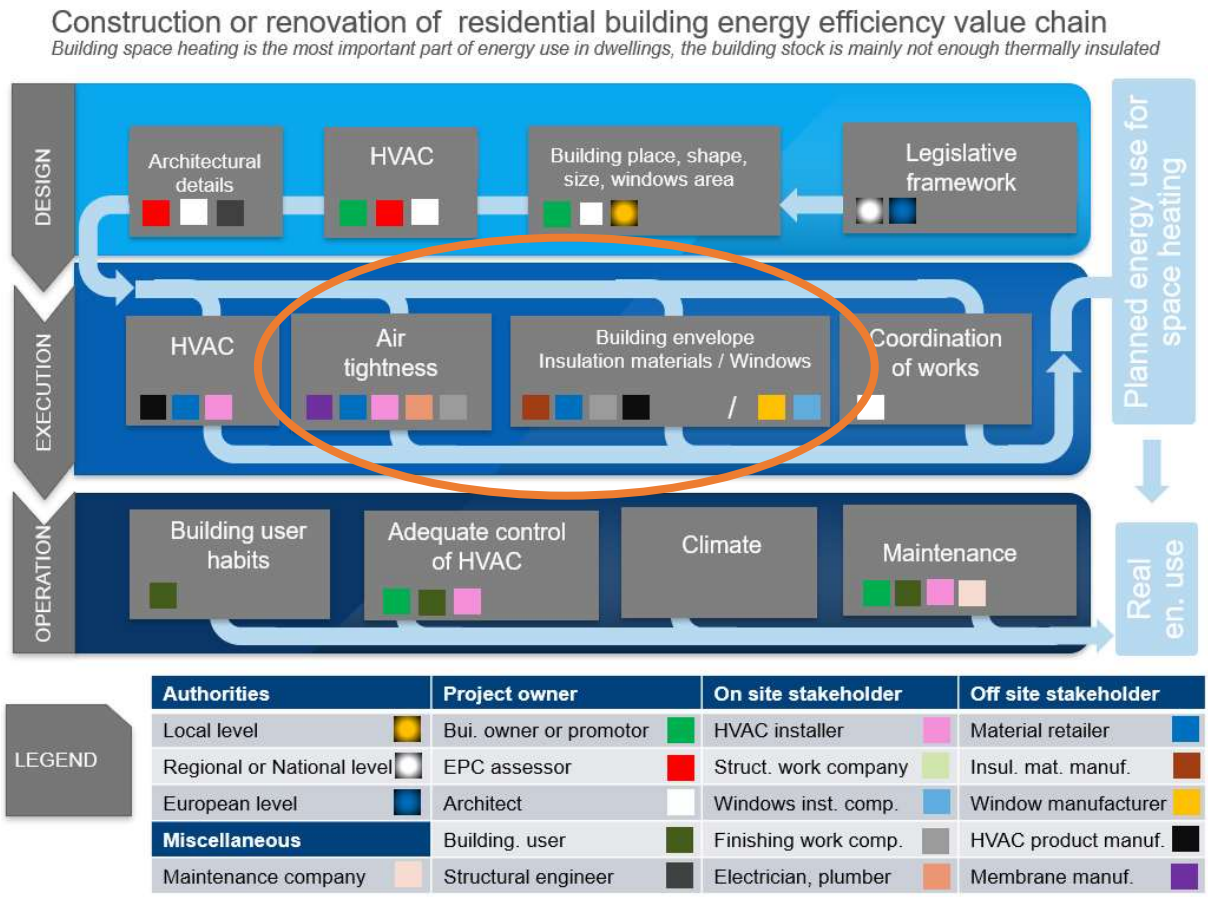

Figure 5: Identification of the energy efficiency value chain associated with windows installation in Poland.

3.2 Demonstration activities

The demonstration #3 tackles this challenge in Poland, and involves the adequate actors in understanding the problems and defining solutions via, amongst others, appropriate upskilling of the staff. The methodology and outcomes are reported in the deliverable D4.3.

4. Other initiatives

4.1. SBA establishment in Luxembourg

In Luxembourg was recently established the local chapter of Smart Building Alliance. A definition of the international association is given: The SBA (Smart Buildings Alliance) was established in 2012 and spearheads Smart Building in France. The primary aim of this association is to provide support to all players of the building industry and regional players regarding digital technology. Leveraging on a highly cross-functional approach, it organises the convergence of the various trades in the sector (SBA 2022). The association brings together all the stakeholders in a collaborative approach to building reference frameworks, approaches, and innovative solutions. The following sectors have the willingness to participate to the SBA in Luxembourg: general contractors, research centres, HVAC installers, smart solutions providers, public and private promotors (NEOBUILD, 2021).

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4.1.1. Scope of application and identification of opportunities

First, the connection between the building smartness and the energy efficiency value chain is not straightforward. An ongoing H2020 project named SmartBuilt4EU[3] shows the co-benefits of the smartness and energy efficiency. For instance, a better control of room temperature settings allows to reduce energy waste. A motorized solar shading system with automatic control based on sensor data can better manage solar gains, reducing cooling/heating demand (SmartBuilt4EU project, 2021). In addition, the current use of web-based applications for building energy management are trustfully linking energy use and smartness in buildings.

Among all objectives, the scope of the association directly linked to energy efficiency is (NEOBUILD, 2021):

- To develop recommendations, produce guides, design methodologies, formulate proposals linked to building smartness
- Promote and communicate the work of the association's commissions to public and private decision-makers, professionals, media outlets and, more generally, to all users and citizens concerned.
- To build reference frameworks to support the transformation of practices, to improve the efficiency of projects, to increase the attractiveness of buildings and territories, by enhancing services and developing new uses.

Some opportunities are also identified (NEOBUILD, 2021):

- Smartness generates a lot of services with a high value, unfortunately there is a lack of framework for harmonizing and pushing forward the efficient use of building smartness. A framework already present in France (CERTIVEA, 2022) could be spread in Luxembourg. The main topics included in the framework are schematized on Figure 6.
- Data management is crucial in the whole building life, there is a lack of common framework from the early design BIM model to the building exploitation and end- of life. The development of a BIM framework is an opportunity to seize. BIM4Value is an example of a BIM framework (B4V, 2022).

[3] https://smartbuilt4eu.eu

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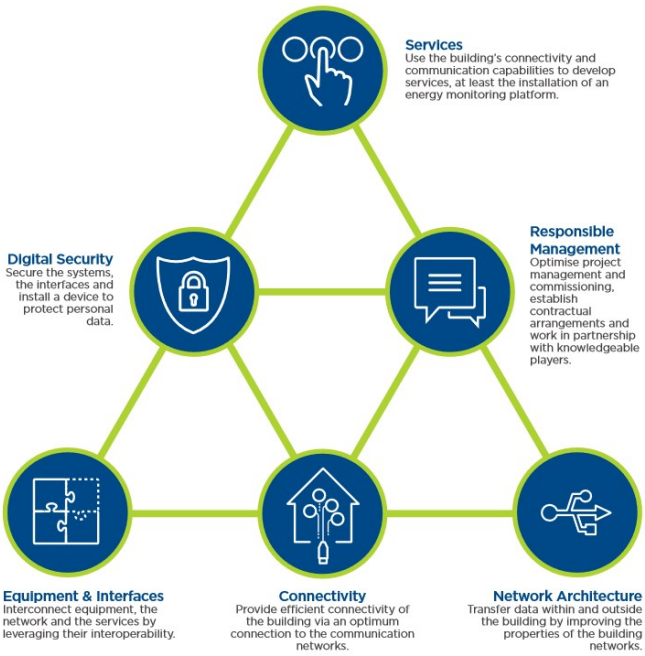

Figure 6: R2S Smart building services framework architecture (R2S, 2018)

4.1.2. Methodology

In this initiative, the partnership is settled into a new association. It gathers some actors of the building sector to work with common goal and better communicate. To structure the partnership, the Smart Building Alliance proposes a methodology for building and managing a national association (SBA, 2021). The whole process is supported by Smart Building Alliance international, located in France. The establishment of the association implies the definition of the following items (SBA, 2021):

- Purpose of the association
- Basic principles (including membership and legal establishment)
- Committees for the different tasks
- Communication features
- Roadmap

4.1.3. Meetings and workshop

A first workshop took place in Luxembourg the 28th of October 2021 (NEOBUILD 2021). The purpose of the workshop was to present the SBA and to listen to the needs of the participants (21 people) of various sectors: general contractors, research centres, HVAC installers, smart solutions providers, public and private promotors. The launching meeting of SBA Luxembourg was held on 11th May 2022.

4.1.4. Impacts of the sensitization

The impacts are not yet defined nor quantified. Nevertheless, a roadmap example of the Smart Building Alliance suggests the following actions for better sensitization to the smart technologies for buildings (SBA 2021):

- Website launch and communication plan
- Communication (Linked-In page, Youtube channel, blog articles...)

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- Presentation of the R2S label to developers via after works events
- Take the message to the right ministers (environment, land use, energy...)
- Winning a first R2S or R2S residential or BIM4Value building with a developer
- Bring SMART Building training to the profession and schools
- Have SBA Academy or local resources

Those examples of actions have impact on large audience.

4.2 BusLeague and BusGo-Circular

4.2.1. Scope of application

Within a number of sister projects implemented under the Construction Skills topic of the EU Horizon 2020 programme for research and innovation (LC-SC3-2018-2019-2020 – Building a Low-Carbon, Climate Resilient Future: Secure, Clean, and Efficient Energy), BUSLeague and BUSGoCircular demonstrate excellent cooperation potential with INSTRUCT, given the fact that they all target direct interventions at market level, stimulating positive changes not only in the educational and training curricula and content, but also in the legal framework and market demand. The overall aim of the earlier and more developed BUSLeague project is to address and overcome the challenges of the stimulation of demand for energy skilled workforce, along with hands-on capacity building programme aimed to increase the number of skilled workforce across the building design, operation and maintenance value chain (supply side)- Figure 7 below. BUSLeague strives to achieve this objective by developing and implementing a cross European recognition of energy skills based on uniform task-based energy skills qualification framework, together with upscaling successful training methods and techniques which have already been developed in previous EU and National initiatives such as BUILD UP Skills, Construction Skills.

4.2.2. Methodology

In the already completed report “Qualification for the recognition of energy efficiency skills” the BUSLeague team elaborates and illustrates a methodical approach as well as the outline and scope for composing a uniform qualification framework which could provide an excellent base of both cross-craft understanding and mutual recognition of energy-related skills. Its universal applicability is defined by the attention to all of the main tasks within the RIBA phases of the investment process, which makes it adaptable to the requirements of the various professional qualification programmes in the area of architecture, construction and facility management. The detailed BUSLeague Energy Skills qualification itself is provided in Excel and as a database within the BUILD UP Skills advisor maintenance environment (the Unit of Learning Outcomes database). Moreover, the different units of learning outcomes linked to the separate tasks are also connected to existing training programmes and materials freely available in English language. Thus, they can be translated, adapted and used in all partner countries to build upon, if national demand is identified. To complete the picture, the learning outcomes are also associated to methods and tools for practical training experience and examination, which makes a complete package for the interested education and training providers and could help the provision of complete training experience.

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Additionally, in full coherence to the outcomes of the INSTRUCT project, BUSLeague captures best practice from across Europe on how to use public procurement to incentivise energy efficiency upskilling. The dedicated report "Using Public Procurement to Incentivise Upskilling - Best Practice Guide" provides examples that are fully compliant with EU tendering rules and highlights the importance of high-quality guidance document and templates accessible to both private and public procurers. As the summary of the report indicates, its main objective is to support and inspire project partners and public bodies to test the energy efficiency training clause and/or the competency-based clause in 2022; however, given that labour and skills shortages represents one of the main risks to the successful decarbonisation of buildings across the continent, it is hoped that the report would also inspire public bodies that are not involved in BUSLeague action.

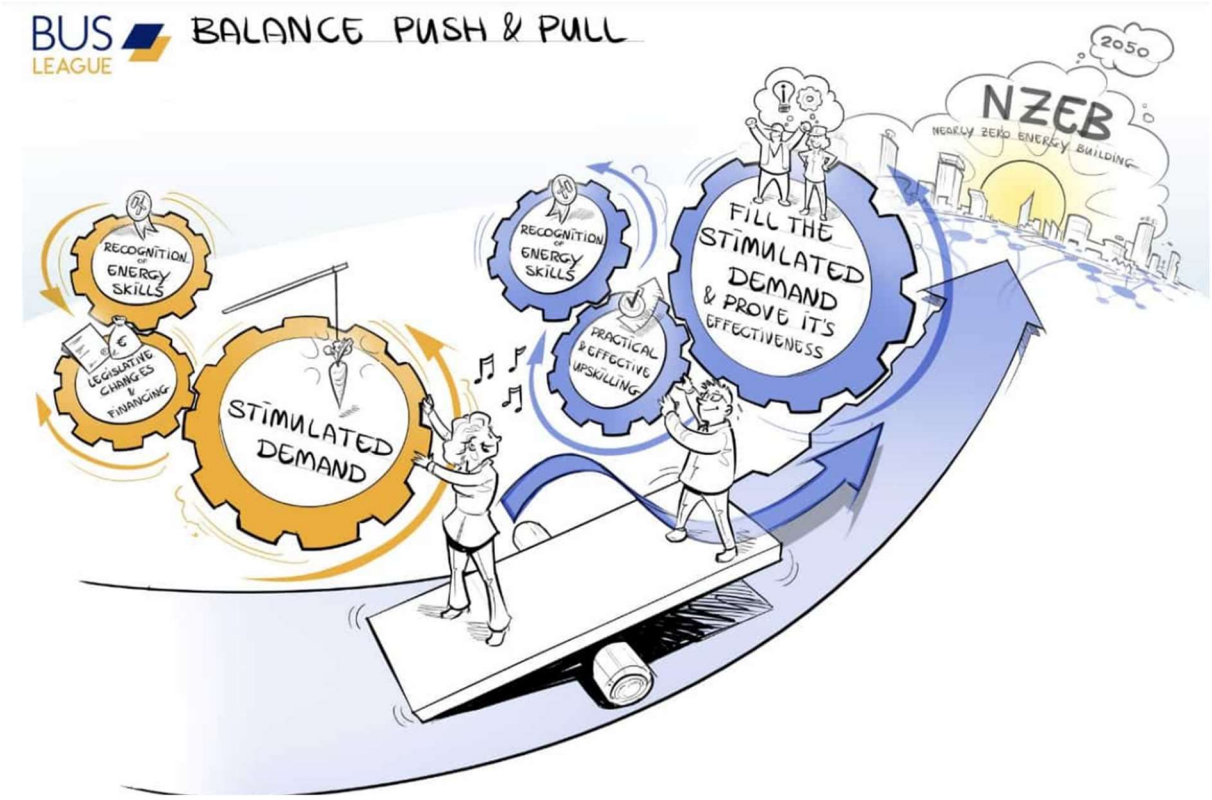

Figure 7 : Overview of the objectives of the BUSLeague project

A similar approach is pursued in the more recent BUSGoCircular project, which aims to address and overcome the challenges of the stimulation of demand for green energy skilled workforce, along with hands-on capacity building to increase the number of skilled workforce across the value chain- Figure 8 below. Again, one of the key actions to achieve this objective is the development of a circular construction skills qualification framework with a focus on multifunctional green roofs, façades and interior elements, providing mutual understanding of the principles and key areas of circularity in construction, as well as basis for mutual understanding of the acquired knowledge, skills and competences/authority. The framework is already available in the dedicated report "Circular construction skills qualification framework", consisting of 9 tasks are the practical equivalents of the key elements of circular economy, and 70 subtasks to further specify strategies to implement circularity in construction. These subtasks are connected to construction sector professions on the one hand, and to Units of Learning Outcomes (ULOs) on the other. The qualification framework is complemented by a table that specifies the 80 relevant ULOs, broken up into competencies, skills, and

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knowledge components. Within the project, the qualification framework will be piloted in real-life educational and training activities in the 7 pilot countries preceded by an intensive train-the-trainer programme, as in both steps the outputs of INSTRUCT could be used and integrated in the training activities.

Figure 8 : Overview of the objectives of the BUSGo-Circular project

4.2.3. Meetings and workshop

Under the Horizon 2020 programme of the EU, we had the opportunity to be beneficiaries of numerous projects from the BUILD UP Skills initiative, along with BUSLeague and BUSGo- Circular. Thanks to that, we have the opportunity to meet, communicate and collaborate with various organisations from all over Europe, working towards upskilling of the construction sector in conjunction with the EPB and RE Directives. This allows us to collect impressions, exchange valuable information and expertise on how to effectively design training schemes on energy efficiency and sustainable design and how to transform building practices. Most of all, during project meetings, we can freely discuss and analyse, propose and collaborate in order to compare and extract essential information for the process of creating capacity and training materials and to implement best practice approach for the training process. An example is the co-development of Units of Learning Outcomes to the training content in a unified manner for the recognition of energy efficiency skills across Europe, aiming to stimulate the demand within the construction sector for such skills on local and national level.

4.2.4. Impacts of the sensitization

The development and application of frameworks for uniform task-based qualification skills on energy efficient design within the BUILD UP Skills projects have been demonstrated during the numerous events organized in cities across Bulgaria, involving professional training sessions for stakeholders from the whole construction value- chain. As a result, a great number of engineers, construction experts, teachers and municipality workers from the cities of Gabrovo (July 2022), Burgas (June 2022) and Pazardzhik and Plovdiv (September 2021) have benefited from the courses by gaining knowledge and

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skills in nZEB design, deep renovation, and sustainable procurement. Not only, but they had the opportunity for networking and exchanging knowledge and experience with other experts from the industry in the area of sustainable buildings. Subsequently, a total of 60 people have been trained in Bulgaria along the BUSLeague project (of the 120 targeted), with another 60 expected to receive a training in December in a row of organized courses (online and live) in Bulgaria. As part of the collective effort for upskilling of the construction sector by the BUILD Up Skills initiative, additional 125 professionals have gained new knowledge on nZEB buildings within the NZEB Roadshow project with many others expected to join during the future activities of the NZEB Ready project.

As for BUSGo-Circular, an ongoing project, training activities are being planned for the upcoming year, therefore, there is no actual measurement of the impacts from the project. However, under the national implementation plan for the project, it is expected than in Bulgaria around 80 professionals will be trained under the Circular skills qualification framework, while at least 24 participants are planned to take part in the Train- the- Trainer courses.

5. Conclusion

In this deliverable, the **Energy Efficiency Value Chain** is identified. It reveals the stakeholders and their relationships having a strong impact in relation with the building's energy efficiency. Even if the frame of the value chain is limited to new single family residential buildings, it illustrates the potential partnerships and their impacts on the energy use in construction.

In accordance with the focus of INSTRUCT project, the polish example is discussed. Partnership amongst window manufacturers and installers would significantly increase the energy savings through the development of workers skills. In general, it is recognized that the partnerships detailed involve directly or indirectly the training and skills increase of the workers.

The skills recognition though remains limited (even geographically or/and for a limited number of people). To enlarge it, some developments in the following fields could be achieved:

- *Raise awareness* - More/adequate information should be given to the building owners on the impacts of the various stakeholders on the overall construction quality. This would help making informed choices for the selection of skilled workers. For example, the coordination of works is a key point to achieve better energy efficient building (see section 2.4).
- The use of *adequate tools* for skills recognition could enlarge the impact of the partnerships. As shown in the partnerships listing described in this document confirms the narrow scope of the partnerships and the difficulties to evaluate their impacts.
- *Strengthen the roles of associations.* Those associations are -in essence- partnerships between companies/entities from the same sector. They have a role for improving the quality of constructions achieved by their members. Putting aside competition between competitors, they can emphasize and promote quality of works and skills recognition.

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7. Annexes

Annex 1: best practices of partnerships around training and collaborative training schemes between target groups. The table is accessible through project intranet (link)
Main contributor: R2M

Glossary

Acronym	Full name
CA	Consortium Agreement
EC	European Commission
EASME	The Executive Agency for Small and Medium-sized Enterprises
GA	Grant Agreement
PC	Project Coordinator
WP	Work Package
TL	Task Leader
DoA	Description of Action
PSC	Project Steering Committee
SQM	Scientific and Quality Manager
DEC	Dissemination and Exploitation Committee
KOM	Kick-off meeting
ASM	ASM – Market Research and Analysis Centre
VTT	Technical Research Centre of Finland
LIST	Luxembourg Institute of Science and Technology
RIL	Finnish Association of Civil Engineers
CU	Cardiff University
R2M	Research to Market Solution France
DTTN	Distretto Tecnologico Trentino
ENEFFECT	Center for Energy Efficiency EnEffect
GER	General Exploitable Result
AB	Advisory Board
PM	Person month
M	Month

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CONSTRUCTION

Evidence-based market and policy instruments implementation across the EU to increase the demand for energy skills across construction sector value chain.

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