



**CONSTRUCT
SKILLS4LIFE**

ROADMAP 2030

**Developing Construction Skills to Enhance the
Sustainability of the Built Environment**



Project identification No:	101076899
Project acronym:	ConstructSkills4LIFE
Project title:	Rebooting the National Platforms for the development of construction skills for all life cycle phases of buildings in Hungary
Call:	LIFE-2021-CET
Start date of project:	01.10.2022.
Project duration:	21 months
Deliverable ID:	D4.2
Due date of deliverable:	30.06.2024
Deliverable Lead Partner:	MÉgKSZ
Work package:	WP4
Keywords:	national roadmap, skill

NAME OF RESPONSIBLE AUTHOR(S)

ORGANIZATIONS (S)

Dr. Lajos Gábor Takács
Dr. Sára Hrabovszky-Horváth
Dr. Csilla Patkó Dr. Perlakiné

Budapest University of Technology and Economics, Faculty of Architecture (BME)

Dr. Károly Matolcsy
Balázs Tóth

ÉMI Nonprofit Llc. for Quality Control and Innovation in Building (ÉMI)

Péter Gyuris

Geonardo Ltd. (GEO)

Pál Vlcskó

Békéscsaba Center of Vocational Training (BSZC)

Dr. István Barótfi
Attila Zoltán

Hungarian Coordinating Association for Building Engineering (MÉgKSZ)

DISSEMINATION LEVEL

| Public

DOCUMENT HISTORY

Version	Date	Reason	Revised by
01	14/02/2024	Draft itinerary for consultation	Dr. István Barótfi
02	21/03/2024	First round of internal consultation	Dr. Sára Hrabovszky-Horváth, Péter Gyuris
03	05/04/2024	Revised, short version for professional consultation	Dr. Sára Hrabovszky-Horváth, Péter Gyuris
04	16/06/2024	English translation and lecturing	Dr. István Barótfi
05	20/06/2024	Final revision of English, editing	Dóra Leitner
06	28/06/2024	Final approval	Dorottya Hujber

Disclaimer

This document has been developed by the ConstructSkills4LIFE project. Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them

© ConstrucSkills4LIFE Consortium, 2024

This product contains the original work of the project partners, which has not been previously published unless explicitly stated otherwise. Any previously published material and the work of others have been appropriately cited. If a source is indicated, the document may be used in accordance with those citations.



**Co-funded by
the European Union**

Further information

More information about the implementation of BUILD UP Skills in Hungary:

<http://www.emi.hu/EMI/web.nsf/Pub/kutatasok-nemzetkozi-constructskills4life.html>
<https://constructskills4life.eu/hu>

More details on BUILD UP Skills can be found at:

<https://build-up.ec.europa.eu/en/bup-skills>

More details on the LIFE CET programme can be found at

https://cinea.ec.europa.eu/programmes/life_en

TABLE OF CONTENTS

1	Foreword	7
2	Executive summary	8
3	Introduction	12
3.1	Purpose and method of developing the Roadmap	12
3.2	Training of construction professionals	14
3.3	Quantified data on the construction industry and construction professionals	15
3.3.1	Hungarian building stock	15
3.3.2	Energy use and planned development of renewable energy	17
3.3.3	Hungarian 2030 energy targets and the expected contribution of the construction industry	19
3.3.4	Number of professionals in the construction sector	20
3.3.5	Additional professional needs to achieve energy targets	21
3.3.6	Qualification needs	21
3.4	Progress achieved at national level within the BUILD UP Skills initiative	23
3.5	Barriers to the achievement of the 2030 target	24
4	General strategy for meeting qualification requirements	27
4.1	Strategic directions of the Roadmap	27
4.2	General strategic areas	29
4.2.1	Short-term goals	30
4.2.2	Long-term goals	30
5	Priority measures for all professions concerned	32
A.	Policy and strategic measures	34
B.	Measures for training programmes	43
C.	Human resources measures	66
D.	Economic and financial measures	73

TABLE OF CONTENTS

6	Action plan and monitoring	75
6.1	Action plan for implementing the specified measures	75
6.1.1	Timeline (at least until 2030)	75
6.1.2	Resources needed to encourage training implementation	80
6.1.3	Financial mechanisms	81
6.1.4	Accompanying measures	81
6.1.5	Planned certification and accreditation	81
6.1.6	Quantifying adult education supporting skills acquisition	82
6.1.7	Structural measures to monitor skills needs in the construction sector	85
6.2	Monitoring the progress of proposed measures	86
6.2.1	Definition of indicators	86
6.2.2	Definition of follow-up activities	86
7	Conclusions	87
	Annex 1- Endorsement of the Roadmap	90
	Annex 2- SWOT analysis summarising findings of the SQA	92
	Authors and contributors	94
	Glossary	95

1

FOREWORD

The aim of the ConstructSkills4LIFE project, co-financed by the European Union under the LIFE programme, is to support the Hungarian construction sector by paving the way to upgrade the skills of blue- and white-collar workers in order to achieve the buildings' energy targets set by the EU and Hungary concerning the Hungarian building stock by 2030.

The project promotes a holistic approach, focusing on a more intensified integration of digital and renewable energy technologies applicable in buildings, improved process management throughout the life cycle of buildings, and practices related to qualitative energy-efficient renovation, subsequently fostering stakeholder cooperation and entrepreneurship that results in a more sustainable built environment.

Building on the results of BUILD UP SKILLS projects previously implemented in Hungary, the consortium revitalized the National Platform by contacting relevant stakeholders involved in construction and construction-related training and vocational training (e.g. educational institutions, policy makers, professional associations, market actors). The consortium conducted an assessment, in the form of a Status Quo Analysis, to get a clear picture of the current state and challenges of the Hungarian construction sector and the possible quantitative and qualitative deficiencies and training opportunities of blue- and white-collar workers with the appropriate expertise.

Based on the Status Quo Analysis, the consortium, expert groups, and Platform members jointly developed a revised Roadmap through conducting workshops. The Roadmap contains recommendations for construction and training in order to respond to the challenges and identified shortcomings, thus facilitating the development of the construction sector, in particular clean energy transition, circular economy, digitalisation, development of know-how, and improving the health impact of indoor air quality.

The tasks set out in the ConstructSkills4LIFE project are carried out by the Békéscsaba Center of Vocational Training, the Faculty of Architecture of the Budapest University of Technology and Economics, Geonardo Ltd. and the Hungarian Coordinating Association for Building Engineering under the leadership of ÉMI Nonprofit Llc. for Quality Control and Innovation in Building.

Qualification needs and gaps in the construction sector

The **conditions for achieving the energy targets related to the built environment planned for 2030** can be realistically formulated and described with relative reliability, considering current technological capabilities and trends. The key factor driving **the changes is the decrease in the volume of new constructions and the significant increase in the proportion of renovation tasks.** In case of new buildings, the conditions for meeting the building energy objectives are already in place. The expertise of the engineers and contractors, the design conditions, regulations, technologies and building materials are suitable for creating facilities that meet the requirements, even if there is already a shortage of labour. It is a more difficult task to determine the needs related to the (deep) renovation of buildings, where planning, implementation and technologies are more complex and unique tasks, requiring more complex expertise. **In addition to economic aspects, labour shortages and lack of professional skills may make it impossible to meet the requirements of deep renovation tasks under the current conditions.**

Within the framework of the ConstructSkills4LIFE project, a Status Quo Analysis titled „*Education and training of building professionals in Hungary*” was carried out in June 2023, analysing the skills needs of building professionals to achieve the 2030 building energy and climate goals. In the document, headcount figures for achieving objectives have been calculated and estimated. The quantitative changes required are summarised as follows:

- To achieve the strategic goal, 3% of residential buildings should be renovated annually by 2030. In 10 years, an additional 136.000 skilled professionals will be needed to work on building renovations, meaning that 13.6 thousand new professionals must enter the market each year, even considering the continued employment of those reaching retirement age.
- The current number of new entrants is 12.6 thousand each year. Based on our expert assumption, 70% of these new entrants will work on (residential) renovation, amounting 8.8 thousand individuals.
- The difference between the required number of new entrants and the number of current graduates is the additional demand, which is 4.8 thousand people per year.

Based on the calculations, the **Hungarian Qualifications Framework (hereinafter: HuQF) for construction industry education and training programmes at levels 1-8 will require an additional 4,800 people annually.** This represents about 30% of the current training capacity. The calculated increase in the number of construction workers (primarily among skilled and unskilled workers) cannot realistically be fully ensured from the domestic labour market.

Proposed measures to fill gaps and meet targets

The Roadmap was developed based on the shortcomings identified in the Status Quo Analysis conducted by the ConstructSkills4LIFE consortium. The current document sets out proposed measures that can foster to fill skills gaps and achieve the building energy and climate goals set for 2030.

The availability of skilled construction professionals is key for the success of the renovation wave of the European Green Deal. Therefore, the new European Skills Agenda sets ambitious and measurable targets for upskilling and reskilling construction professionals. Aligning with the European Union's programmes and objectives was an important goal in defining necessary measures. The proposed measures developed within the project are listed in Table 1 and can be found in more detail in Chapter 5.

The **ConstructSkills4LIFE project primarily aimed to identify the gaps in skills and competences of the building professionals** and propose solutions to address them, involving the possible key organisations (National Platform) that can play a role in the implementation of proposed measures. The members of the Platform are organisations for whom skill and competence development should be a key future priority. However, they also have many other responsibilities in their work. As a result, members of the National Platform often have to prioritise their immediate tasks over the development of skills and capabilities needed for achieving carbon neutrality in building stock. This has also an impact on the development of a realistic action plan. The action plan and monitoring depend on the nature of the measures and the stakeholders involved and they need to be handled on a case-by-case basis. When planning the timing of measures, a significant factor was the limited timeframe available for skill development. **Non-formal education (training) outside the school system may be the most viable solution, considering that restructuring formal education would take at least five years and would not support achieving the goals set for 2030.**

Therefore, the proposed measures developed by the ConstructSkills4LIFE consortium aim to focus on the following two main areas:

- Adult education.
- Other non-formal (continuing) training.

In both areas, implementation will take more than a year. In these types of trainings, private or state-supported private education also appears, offering a much faster and more flexible solution compared to formal education. In the case of micro-certificates, the launch of trainings follows the same schedule, but accreditation processes must be conducted simultaneously with content development. The introduction of micro-credentials is a determined intention of the Hungarian authorities responsible for education and training. The establishment of the system and its operation is currently ongoing. The domestic micro-credentials system intended to be aligned with the international framework and achieving mutual recognition is also expected.

The timing and feasibility of other proposed measures are specific and can be found in the detailed description of each measure.

It is important to note that the other measures for skill and competence development, which can be implemented over a longer period, such as various levels of the educational system, need to be started as soon as possible due to the inertia of the larger system. However, the timeline for this was considered indeterminate in this study.

Table 1: Proposed measures of the Roadmap

Policy and strategic measures (A)	
A.1	Development of the Hungarian Construction Industry Sustainable Requirements System
A.2	Stabilisation of the legislative environment
A.3	Defining compulsory qualifications
A.4	Graduate Career Tracking System for the construction sector
A.5	Review of the entitlement system
A.6	Inventory of the built environment
A.7	Development of construction careers
A.8	Complex registration system in the construction industry
A.9	Skills and competence development website
Measures for training programmes (B)	
Quantity and quality of expertise at all levels	
B.1	Revision of the curriculum (training and learning outcome requirements) at all levels
B.1.1	Revision of the curriculum at HuQF level 3-5
B.1.2	Revision of the curriculum at HuQF level 6-7
B.2	Development of (further) training programmes for sustainability in the construction sector at all levels
B.2.1	Development of (further) training programmes at HuQF level 3-5
B.2.2	Development of (further) training programmes at HuQF level 6-7
B.3	Training of building operators and the public
B.4	Promoting the digital construction industry
Introducing innovative elements into training	
B.5	Organising and supporting competitions at all levels
B.5.1	Organising and supporting professional implementation excellence competitions at HuQF level 3-5
B.5.2	Organising and supporting of competitions at HuQF level 6-8
B.6	Introduction of interdisciplinary programmes and more flexible courses
Lifelong Learning	
B.7	Training of trainers
B.7.1	Training of trainers at HuQF level 3-5
B.7.2	Training of trainers at HuQF level 6-7
B.8	Non-marketing communication training
B.9	Occasional professional development courses HuQF level 3-8
Human resources measures (C)	
C.1	Awareness-raising
C.2	Motivating further education and postgraduate courses
C.3	Measures to promote women's participation
C.4	Promoting career guidance for young people at HuQF level 1-6
C.5	Demographic overview of workers in fossil fuel industry, assessment of skills and planning their integration into the construction industry
C.6	Involvement of construction companies in career guidance tasks
Economic and financial measures (D)	
D.1	Financing adult education and training
D.2	International Mobility Programme for teachers and trainers

Endorsement of the Roadmap and supporting its implementation

The Roadmap is addressed to all actors and organisations who potentially can contribute to overcome the identified obstacles and skill shortages. In addition to the organisations already participating in the National Platform, the document is of interest to all stakeholders who have the opportunity to support and undertake initiatives that are in line with the priorities and measures set out in the Roadmap.

The Roadmap development was coordinated by the ConstructSkills4LIFE project's consortium and the measures described in the document were developed in consultation with the professional stakeholders participating in the National Platform. The key measures and their planned implementation schedule were presented in consultations with the competent authorities and, as members of the National Platform, they agreed on the priority actions and timetable. At the same time as this document is concluded, consultations are taking place with the supporting organisations on the implementation of the proposed measures set out in the Roadmap. The competent organizations involved in the education of construction professionals are formulating proposals to support the Roadmap aligning with their roles and capabilities within the construction economic ecosystem. Consortium members are gathering Endorsement letters from relevant stakeholders, the outcomes of which will be presented in an Endorsement Report. The list of supporting organisations is set out in Annex 1.

3 INTRODUCTION

The relaunch of the National Platform for developing construction skills in Hungary is a realistic objective if it is based on a genuine and current assessment of the situation considering all phases of a building's lifecycle. This chapter provides background information by summarising key data and information extracted from the Status Quo Analysis¹.

3.1 Purpose and method of developing the Roadmap

As part of the **BUILD UP Skills initiative** launched by the European Commission in 2011, 13 BUILD UP Skills projects are currently implemented across Europe. These projects, co-financed by the LIFE Programme and managed by national consortia, aim to promote the widespread adoption of high energy-efficiency building renovations and the construction of nearly zero-energy buildings. The aim of the national consortia, including ConstructSkills4LIFE, is to revitalise the work of the National Platforms established within the framework of projects implemented almost a decade ago and to develop a Status Quo Analysis and a subsequent Roadmap based on it (Figure 1).

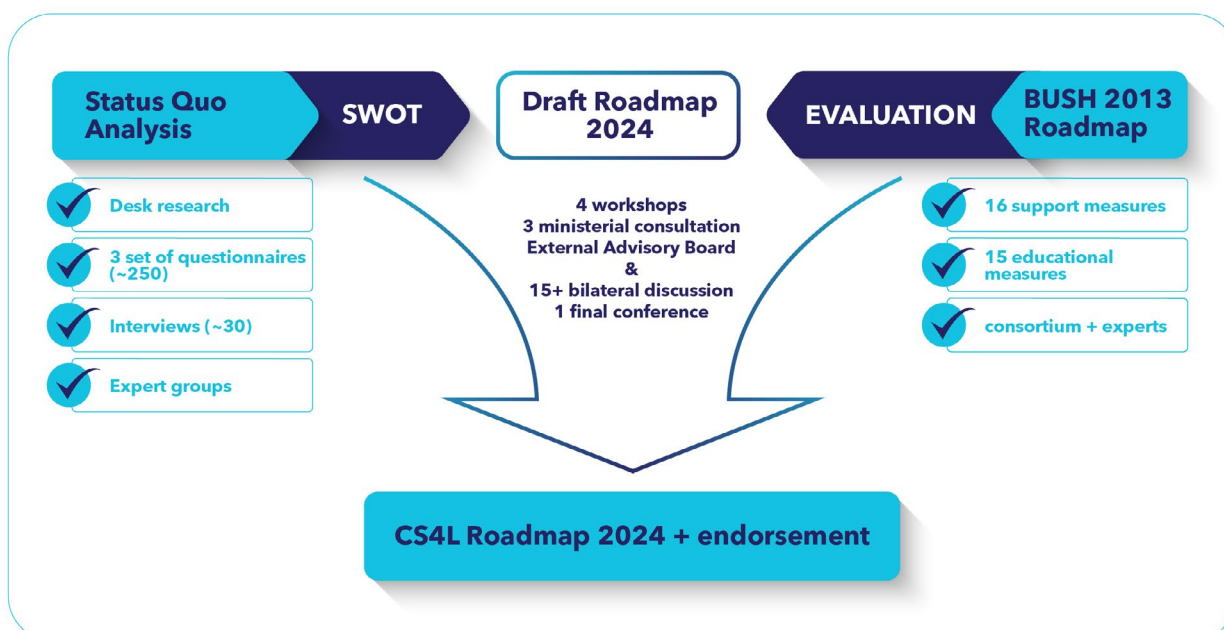
Methodology and steps of preparing the Roadmap:

- Development of the Status Quo Analysis:
 - Literature review
 - Questionnaires and interviews
 - Expert group discussions
 - SWOT Analysis
- Analysis and evaluation of the results of the Roadmap developed by the BUILD UP Skills Hungary (BUSH) project in 2013
- Setting up a National Platform and gathering feedback from a broad range of professionals through various forums:
 - Workshops
 - Professional consultations
 - External Advisory Board's recommendations
 - Final conference

^{1,2} Education and training of building professionals in Hungary: Status quo analysis on education and training of building professionals- skills needed to achieve the 2030 energy-efficiency and climate targets, - ConstructSkills4LIFE, June 2023

Figure 1. : Methodological presentation of Roadmap development

From SQA to Roadmap



Status Quo Analysis

Updating the results of the BUILD UP Skills Hungary (BUSH) project implemented between 2011 and 2013 under the leadership of ÉMI Non-profit Ltd., the ConstructSkills4LIFE project developed a study entitled „Status Quo Analysis on education and training of building professionals in Hungary – skills needed to achieve the 2030 energy-efficiency and climate targets²„ in June 2023. The main objective of the document was to assess whether blue- and white-collar professionals currently working in the construction industry as well as those soon to enter the labour market, possess the necessary skills and knowledge to achieve the national building energy targets set for 2030 and the decarbonization goals for 2050.

The ConstructSkills4LIFE consortium thoroughly analysed policy documents, EU directives and regulations related to training and education in the Status Quo Analysis, highlighting issues that are significant for the Action Plan. Hungary’s commitments within the EU’s climate and energy policy goals for 2030 can be found in national policy documents.

Through questionnaires, interviews with building professionals and trainers of vocational training institutions, as well as through expert group meetings, the skills and competencies of professionals working in the construction sector were mapped.

As part of the research, a SWOT analysis was conducted to map the strengths, weaknesses, opportunities and threats of construction industry trainings, involving vocational training institutions, higher education institutions, construction companies and professionals. The SWOT analysis presents the results of the

questionnaire and the roundtable discussions of expert groups, as well as the opinions of experts from the interviewed organisations. Detailed results can be found in Annex 2.

National Platform

The Roadmap was developed and refined through four roundtables **involving members of the National Platform** held between July 2023 and January 2024. Additional consultations with key ministries - such as Ministry of Culture and Innovation, Ministry for National Economy, Ministry of Construction and Transport - aimed to ensure consistency with relevant policies. To finalize the planned measures of the Roadmap, consortium members conducted bilateral and small group professional consultations with the key stakeholders of the construction, training and education sectors, considering the entire life cycle of buildings.

Analysis of the results of the BUSH project

During the preparation of this document, the Roadmap published in 2013 by the BUILD UP Skills Hungary (BUSH) project - implemented between 2011 and 2013³ - and its 31 listed measures were evaluated. This evaluation aimed to enable the ConstructSkills4LIFE project consortium to develop realistically achievable measures to support the attainment of the 2030 goals.

Building on the shortcomings, challenges and opportunities identified in the study, the Roadmap developed in the previous BUSH project was updated. **The main objective of the Roadmap is to formulate measures and policy recommendations for 2030 (with a 2050 perspective) involving participants of the National Platform and key industry actors.** The ConstructSkills4LIFE project aims to enhance the skills of construction professionals and advance the national construction industry to international standards. The Roadmap is designed to address policy challenges within the construction sector by offering guidance and recommendations. It is developed with the support of professional organizations and governmental actors involved in the construction industry and related vocational training. Through Platform activities, the Roadmap aims to summarise and represent the interests of construction companies, professional organisations, those involved in construction-related training at levels 1-8 of the European Qualifications Framework (EQF), as well as the public and the national economy.

3.2 Training of construction professionals

In Hungary, we have been using the Hungarian Qualifications Framework (HuQF) based on the European Qualifications Framework (EQF) system for lifelong learning since 2015.

Vocational education and training (HuQF 3-5) prepare individuals for occupations or activities that do not require higher education qualifications. It includes basic vocational training as well as specialized

³ Roadmap for the development of training in the construction industry. BUILD UP Skills Hungary project. May 2023. Available: <https://build-up.ec.europa.eu/en/skills/projects/build-skills-hungary-1ee-pillar-1>

vocational education for specific trades, as regulated by the Act on Vocational Training⁴. The training structure comprises two main branches: one branch consists of professions (vocational training) **that can be acquired in vocational education and training institutions**, while the other consists of **vocational qualifications (adult education)** that can be obtained within the framework of vocational training organised by VET institutions or adult education institutions.

In Hungary, **higher education (HuQF 6-8)** has been structured within the framework of the European Higher Education Area (Bologna Process) since 2005, adopting a multi-level education approach. Higher education is divided into three main stages: undergraduate/Bachelor's studies (BA, BSc), graduate/Master's studies (MA, MSc) and doctoral programmes (Ph.D, DLA). The „Transition in higher education: Medium-term policy strategy - 2016“⁵ highlights the serious skills shortages of professionals in natural sciences, engineering, and information technology fields. It underscores the importance of stimulating students' interest during their secondary school studies to ensure adequate recruitment and equip them with the necessary skills and knowledge for successful admission and completion of higher education programmes.

The vocational training is organised by **VET** or adult **education institutions** and provides an opportunity to obtain a vocational qualification (HuQF 3). These are usually qualifications obtained in a shorter period of training, often by taking into account previous studies or professional experience (e.g. façade builder and installer).

In addition, it is important to note that construction and technology companies play a significant role in imparting knowledge and skills to professionals in the construction industry through various courses and company training programs. This provides professionals the opportunity to get acquainted with the latest technologies available on the market in a short time.

Due to the short timeframe, the skills development needs identified in the project objectives can best be met within the framework of adult education. There is a need for training programmes that provide modern technological knowledge that meets today's challenges in a short time and have adequate quality assurance.

3.3 Quantified data on the construction industry and construction professionals

3.3.1 Hungarian building stock

According to the latest census data in 2022, Hungary has a **housing stock** of nearly 4.6 million dwellings (Figure 2), of which approximately 3.9 million units are inhabited⁶. Of these, 62% are single-family houses, 22% are traditional condominiums and 16% are condominiums built with industrialized technology. There is significant potential for savings in the building sector, as Hungary has relatively high energy consumption per dwelling compared to the EU average, indicating generally low building efficiency. Nearly 25% of single-family houses were built before 1945 and nearly 50% between 1946 and 1980, meaning that **nearly three-quarters of single-family houses were built before 1980 and are considered outdated in terms of energy efficiency**. These older **single-family houses** typically have the **highest primary energy**

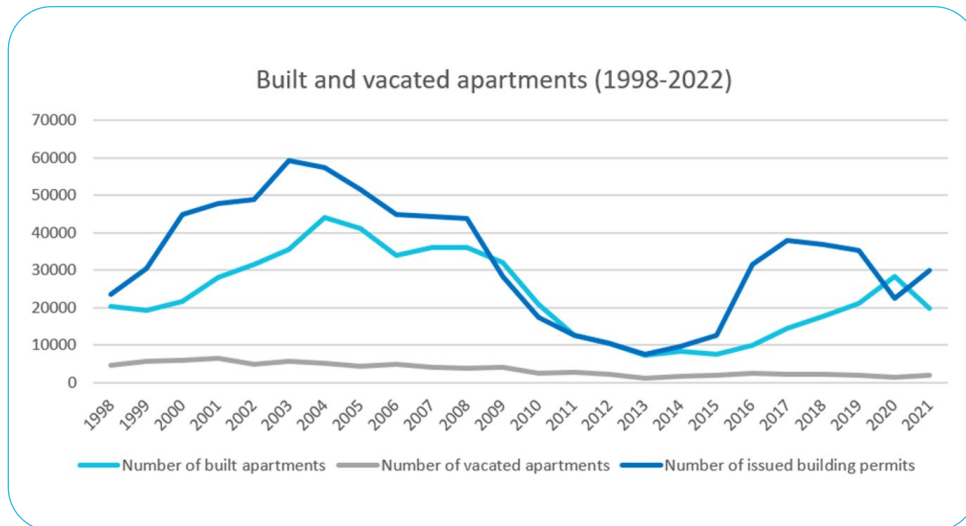
⁴ Act LXXX of 2019 on Vocational Education and Training and Government Decree 12/2020 (II. 7.) on the implementation of the VET Act, Act LXXVII of 2013 on Adult Education and Government Decree No. 11/2020 (II. 7.) on its implementation

⁵ https://2015-2019.kormany.hu/download/c/9c/e0000/Fokozatvaltas_Felsooktatasban_HONLAPRA.PDF

⁶ State of play of the construction industry 2022. Hungarian Central Statistical Office

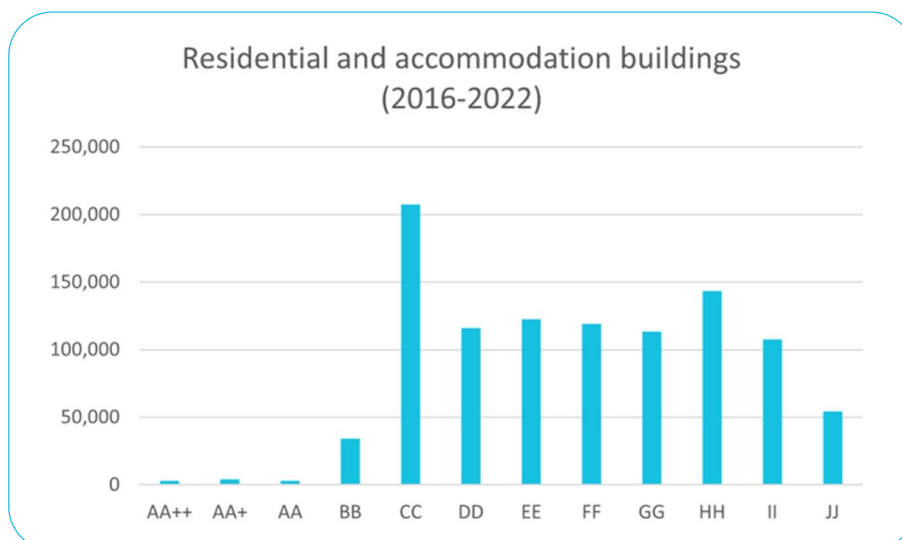
consumption rates, consuming approximately 400-550 kWh/m² annually. The least efficient condominiums are non-panel buildings with 10 or more apartments built before 1945 consuming around 350 kWh/m² per year. Panel residential buildings have a primary energy consumption rate of approximately 200-220 kWh/m² annually⁷.

Figure 2: Built and vacated apartments 1998-2022 [own ed., source of data: Hungarian Central Statistical Office]



Data of **energy performance certificates issued in Hungary covering residential buildings shows that, nearly zero energy buildings** (rated BB or better) account for 4.3% of residential buildings. Modern or nearly modern buildings (rated CC or DD) make up 31.4%, while those around average (rated EE, FF, or GG) constitute 34.5%. Buildings rated HH or worse account for 29.7% (Figure 3). However, this does not accurately reflect the entire building stock. It underrepresents buildings with poor energy efficiency because they are less marketable, therefore they are not certified. Conversely, it overrepresents new buildings, due to the fact, that an energy performance certificate is mandatory for all newly built buildings.

Figure 3: Certification of residential and accommodation buildings, made between 2016 and 2022 [source of own ed. data: <https://entan.e-epites.hu/>]



⁷ Tamás Csoknyai (2013): *Building typology for the energy modelling of the Hungarian residential building stock (Background study to the National Building Energy Strategy)*

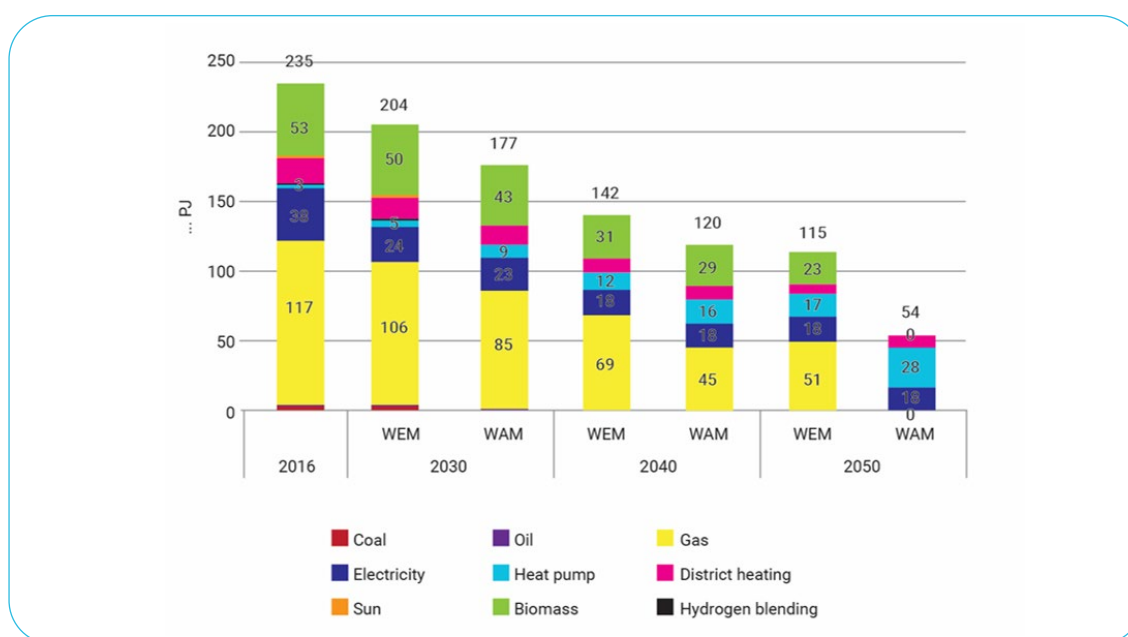
Currently, **the annual renovation rate is only 1% of the total floor area of residential buildings**⁸, which is equivalent to approximately 55,000 apartments per year. An even bigger problem is that **there are hardly any deep renovations**, i.e., investments in which the building is largely free of carbon dioxide emissions. To renew the Hungarian building stock and to achieve of a decarbonized building stock by 2050, **100-130 thousand residential buildings would require deep energy renovation each year**⁹.

3.3.2 Energy use and planned development of renewable energy

Data on expected energy savings in the construction sector are generally estimations and are typically refer to changes **in the amount of energy consumed during the use of buildings**. However, when considering the entire lifecycle of a building, the energy required for operation is currently the most significant factor. Nevertheless, **as energy consumption decreases, the cumulative embodied energy in materials used during construction or renovation, as well as the energy consumed during transportation of these materials, becomes increasingly significant**.

The Long-Term Renovation Strategy (LTRS) declares that buildings are among the largest CO₂ emitters and energy consumers in Hungary, with residential buildings accounting for approximately 27% of the total final energy consumption. In 2021, the final energy consumption in the residential sector was 268 PJ, of which 73% was used for heating and cooling¹⁰. The energy consumption of public buildings contributes to nearly 10% of the overall building energy consumption in Hungary¹¹.

Figure 4: Comparison of residential final energy consumption and change in composition for WEM and WAM scenarios - impact of new policy measures, PJ [NECP, 2023]

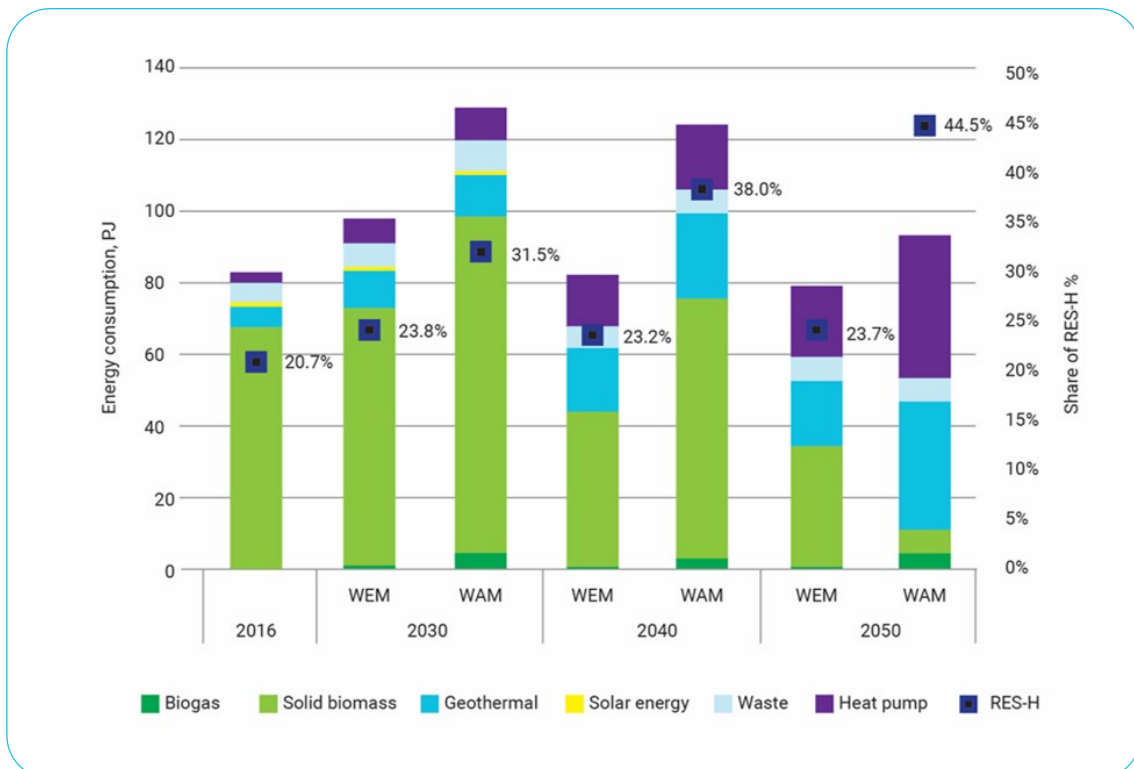


⁸ Long-Term Renovation Strategy under Directive (EU) 2018/844 to fulfil enabling conditions for the payment of cohesion funding for the period 2021-2027. Ministry of Innovation and Technology.
⁹ MEHI (2021): Hungarian renovation wave - Examining the potential of energy efficiency modernization of the Hungarian residential building stock and the wide-ranging effects of certain support instruments. Hungarian Institute of Energy Efficiency. 2021.
¹⁰ Hungary 2022, Hungarian Central Statistical Office, 2023: https://www.ksh.hu/docs/hun/xftp/idoszaki/mo/mo_2022.pdf
^{11,12,13} National Energy and Climate Plan 2023 (NECP)

Proportionally, the most significant decrease in residential final energy consumption (Figure 4) is expected to occur in natural gas usage by 2030. Due to planned energy efficiency measures and the transition to alternative heating modes, residential natural gas consumption is expected to decrease by around 54% between 2016 and 2030. The National Energy and Climate Plan (NECP) forecasts a slight decrease in district heating consumption, but it also expects an increase in the proportion of renewable energy within this sector. Electricity consumption is expected to increase by 23%, making it the main energy source in the residential sector after 2030. Coal and oil consumption are projected to almost completely cease by 2030¹².

In the heating and cooling sector, the share of **biomass** is currently high, accounting for over 80% of **renewable energy consumption**. It is expected to increase by 41 % between 2019 and 2030, followed by a projected decline after 2030 (Figure 5). The second most important source is **geothermal energy**, which is one of Hungary’s significant energy reserves but remains largely untapped today. The use of geothermal energy is expected to double by 2030¹³. In addition, there will be a significant increase in the use of **heat pumps** in the heating and cooling sector with an anticipated share of 8% by 2030 and reaching 44% by 2050 within renewable energy consumption. **Biogas** utilization is also expected to increase significantly, yet its share within renewables in the heating sector is projected to be only 4% by 2050.

Figure 5: Renewable energy use in the heating and cooling sector (PJ) and renewable share (RES - H, %), WEM and WAM scenarios, PJ and % respectively [NECP, 2023]



As a result of the above measures and additional measures (WAM), the **share of renewable energy** consumption within the heating-cooling sector is projected to increase **from the current level of around 20.7% to 32% by 2030**. Under the same scenario, due to the decreasing final energy consumption, this share is projected to rise to 45% by 2050.

Reducing the energy consumption of buildings does not depend solely on increasing the volume of investment, but also on the appropriate reform of building legislation. **Current regulations usually place cityscape aspects over climate protection** considerations (such as orientation of buildings, restrictions on the installation of solar panels, wind turbines or insulation), a luxury that we can afford less and less during times of climate emergency.

It is important to mention, however, that the evolution of energy consumption over time is influenced by numerous factors beyond energy efficiency achieved on the user side, such as population size, economic activity and structure, temperature and consumer habits.

3.3.3 Hungarian 2030 energy targets and the expected contribution of the construction industry

The Hungarian government's Long-Term Renovation Strategy (hereinafter: LTRS), adopted in 2021, sets the goal of reducing the carbon dioxide emissions of the domestic residential building stock by 20% and the emissions of public buildings by 18% by 2030. Additionally, the strategy targets that 20% of all buildings should be nearly zero-energy by 2030¹⁴. Furthermore, another goal is a 60% reduction in CO₂ emissions related to the energy use of buildings by 2040 compared to the average between 2018-2020 and by 2050¹⁵, as well as the achievement of a 90% share of buildings corresponding to the nearly zero energy demand level.

Table 2: 2030 targets¹⁶

Hungary energy targets		2020	strategic energy targets 2030	contribution of the construction industry - 2030
GHG emission	CO ₂ emission	43,8 Mt CO ₂	reduction of GHG emissions by 50% (level of 1990)	- 20% (residential buildings) - 18% (public buildings) (level 2018-2020)
Energy efficiency	final energy consumption	776 PJ	max 750 PJ	refurbishment of residential buildings 3% per year 20% reduction in energy consumption in resid. build. refurbishment of public buildings 3% per year 20% of buildings with near-zero energy performance
Renewable energy share	gross final energy consumption	13,80%	29%	average 4kW roof-mounted solar panels in a 200,000 households (800MW in total)

¹⁴ A Long-Term Renovation Strategy under Directive (EU) 2018/844 to fulfil enabling conditions for the payment of cohesion funding for the period 2021-2027. Ministry of Innovation and Technology.

¹⁵ National Energy and Climate Plan 2023 revised version: https://commission.europa.eu/system/files/2023-09/HUNGARY%20-%20DRAFT%20UPDATED%20NECP%202021-2030%20_HU.pdf

¹⁶ The strategic energy goals are 2030 based on the 2023 revision of the National Energy and Climate Plan

Assuming that average residential buildings are renovated to the extent that their emissions reach zero emissions, **according to LTRS**, this would mean approximately **50,000 home renovations per year by 2030**. This would reduce the annual emissions by around **2.3 million tonnes by 2030**. In addition, the public building renovation target would result in an additional reduction of about **400,000 tonnes**.

3.3.4 Number of professionals in the construction sector

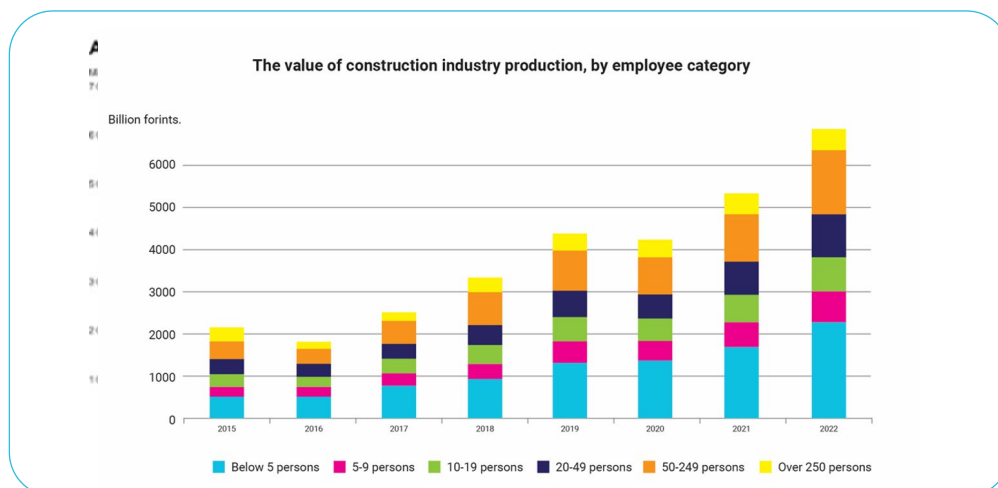
Based on residential employment data, the **number of people employed in the construction industry in 2022 was 380,400**, accounting for 8.1% of the total employment in the national economy^{1z}. This trend has been increasing, according to data from previous years. Within this, the number of professionals involved in building construction and renovation is estimated to be around 280,000 (Table 3).

Table 3: Current construction workforce [own edit, source of data: Hungarian Central Statistical Office]

Number of professionals involved in the construction and renovation of buildings			
HuQF level	subsector	2021	2022
HuQF 1-4	construction	92 000	93 472
	building service	60 100	61 062
	building electricity	45 700	46 431
HuQF 5-7	construction	37 200	37 795
	building service	24 600	24 994
	building electricity	15 700	15 951
total		275 300	279 705

It is important to note that achieving carbon neutrality goals requires not only an adequate quantity and quality of employees in the construction industry, as there will also be a demand for many other professionals (e.g. IT specialists, programmers, sustainability consultants, etc.) who are employed in other sectors and thus do not appear in the above statistics.

Figure 6: Value of construction industry production, number of employees by category, 2015-2022 [Hungarian Central Statistical Office, Overview of the construction industry, 2022]



The number of registered construction companies has been steadily increasing since 2017, thanks to the dynamic growth of new entrants. **By the end of 2022, 147.4 thousand enterprises** were registered in the construction sector, indicating that more than 90% of enterprises have fewer than 5 employees¹⁸ (Figure 6).

3.3.5 Additional professional needs to achieve energy targets

The additional demand required to achieve the 3% annual rate of refurbishment of residential buildings set out in the strategy is approximately 4.8 thousand professionals per year, which is approximately 30% of the current capacity in education and training.

Table 4: Number of new graduates (new entrants) in the construction sector per year and additional needs to achieve the strategic renovation goal, by HuQF categories (based on expert estimate)

HuQF level	New graduates per year (pers.)	Additional demand (pers.)
HuQF 1-5	8 730	3 200
HuQF 6-8	3 940	1 600
Total	12 670	4 800

3.3.6 Qualification needs

As a result of comparing the expected competency levels of professionals impacting energy efficiency of buildings with the current education system, the following conclusions can be drawn:

- **HuQF 3-5:** The current education system requires partial improvement in terms of building rehabilitation, energy modernization of historic buildings and in terms of nearly zero-energy buildings. Significant improvements are necessary in the fields of circularity, digitalisation (specially Building Information Modelling), smart solutions and buildings.
- **HuQF 6-7:** : The current education system needs improvement in the areas of building rehabilitation, energy modernization of historical buildings, environmental life cycle analysis - circularity, building rating systems, smart buildings, and smart cities/communities.

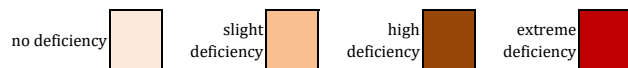
Table 5 summarises the gaps identified by the ConstructSkills4LIFE projects' consortium in relation to the expected competences of professions and qualifications. The competency gap maps show areas within each profession where curriculum development is needed.

¹⁸ State of play of the construction industry 2022. Hungarian Central Statistical Office

¹⁹ Status Quo Analysis on the training of construction professionals – skills needed to achieve the 2030 building energy and climate targets. ConstructSkills4LIFE project. 2023.06

Table 5: Competence gaps in professions and qualifications for HuQF 3-5

Competence gap map - HuQF 3-5 market practitioners			Relevant topics - competency level expectation										
Type of qualification	Field of expertise	Level	EXECUTION of nearly zero energy buildings	INSTALLATION of renewable energy equipment	Deep renovation-EXECUTION	Renovation of listed buildings-EXECUTION	Circular construction model	Building information modelling (eg. BIM)	Dynamic building simulation	Smart solutions and buildings	Life cycle analysis (eg. LCA)	Building certification systems	Smart cities and communities
VOCATIONS (Register of vocational occupations)		HuQF											
Electronics and electrical engineering	Automation technician	5											
	Electrician	4											
Construction	Mason	4											
	Building construction technician	5											
	Structural engineer and fitter	4											
	Insulation specialist	4											
Building engineering	Building Services Engineering Technician	5											
	Cooling and ventilation system installer	4											
	Central heating and gas network installer	4											
	Water and sewerage installer	4											
PARTIAL VOCATIONS OF VOCATIONS													
Construction	Bricklayer	3											
	Heat and sound insulation specialist	3											
Building engineering	Flue gas drainage fitter	3											
	Pipe network fitter	3											
PROFESSIONAL QUALIFICATION (Programme requirement)													
Construction, building and civil engineering	Flue-gas ducts installer	3											
	Facade constructor and fitter	3											
	Window and shading fitter, installer	3											
Energy, electricity	Gas and heat producing equipment mechanic	4											
	Cooling equipment operator	3											
	Cooling equipment, air-conditioner and heat pump mechanic	4											
	Facility energetics technician	5											
	Renewable and other primary energy source power plant operator	4											
	Electrical distribution network installer, operator	4											

Competency GAP LEVEL legend:


Regarding higher education, the distinction between the two levels (BSc, MSc) is important because it clarifies which topics would be necessary for students to learn at each level. The specializations developed in MSc programmes already narrow down the range of students who receive additional knowledge, although the specialization is not named in the title of the degree obtained. The competence gaps in the case of HuQF 5-6 are defined in Table 6.

Table 6: Competence gaps for HuQF 6-7

Competence gap map - HuQF 6-7 market practitioners				Relevant topics - competency level expectation										
Qualification	Profession	Specialisation (relevant from building energy point of view)	HuQF	DESIGN of near-zero energy buildings	PLANNING of renewable energy devices	Deep renovation PLANNING	Renovation of listed buildings DESIGN	Circular construction model	Building information modelling (eg. BIM)	Dynamic building simulation	Smart solutions and buildings	Life cycle analysis (eg. LCA)	Building certification systems	Smart cities and communities
BSc	Architect		6											
	Electrical engineer	sustainable electricity	6											
	Energy engineer		6											
	Civil engineer	building technology and management	6											
MSc	Architectural engineer	construction	6											
		BIM and management	6											
		architectural heritage	7											
		architecture	7											
		form and structure	7											
		real estate development	7											
	Electrical engineer	eco and innovative building structure	7											
		urban architecture	7											
		electrical energy systems	7											
		building electricity - side specialization	7											
	Energy engineer	smart city - side specialization	7											
		green electrical energy - side specialization	7											
		renewable energy sources	7											
	Mechanical engineer for building services and processes	energy management	7											
		comfort building service engineering	7											
	Civil engineer	construction and renovation	7											
structural systems		7												
Construction information technology engineer		7												

Competency GAP LEVEL legend: no deficiency (white), slight deficiency (light orange), high deficiency (dark orange), extreme deficiency (red)

Based on our calculation, the required skills development **means a total of 28,524** one-day (8 contact hours) courses per year. These courses only cover further training in the relevant topics listed in the tables and do not take into account the data and needs of other legal, professional and product-oriented further trainings.

3.4 Progress achieved at national level within the BUILD UP Skills initiative

Between 2011 and 2013, under the first pillar of the BUILD UP Skills initiative, the **BUS Hungary (BUSH) project** developed a strategic proposal package outlined in a Roadmap. This package contained 31 measures in the fields of construction industry and training. The Roadmap completed in 2013 took into account the training needs of professionals with secondary vocational qualifications. The BUILD UP SKILLS TRAIN-BUD (BUS Pillar II) project has taken steps to implement these proposed measures. The **TRAINBUD project** run between 2014 and 2017 under the coordination of ÉMI Non-profit Ltd. Its goal was to support the EU's 2020 energy efficiency targets by providing a sufficient number of qualified professionals. As a result of TRAINBUD, a Sustainable Construction Knowledge Alliance was established in cooperation with 74 members, 15 professional organizations and 35 manufacturing and trading companies. A training material comprising 10 modules on energy-efficient solutions was developed. The project also included training of trainers with 64 vocational schoolteachers and 26 professional training sessions with a total of 432 participants. As a continuation of the BUILD UP Skills initiative, ÉMI Non-profit Ltd. participated as a partner and work package leader in the Austrian-coordinated [NEWCOM project](#) (2017-2020). The aim of the project was to train construction professionals needed for the construction and renovation of nearly zero-energy buildings, to develop the necessary training system, to recognize them among Member States and to establish a certification system. As a result of the NEWCOM project, ÉMI developed training materials for flat roof

professionals and conducted several courses on flat roofing, ventilation and technical inspector knowledge with a total of 50 instructors participating.

As part of the initiative's current phase, ÉMI Nonprofit Kft. is participating as a partner in the Dutch-coordinated [BUS-GoCircular project](#) (2021-2024). The project aims to overcome the challenges related to stimulating the demand for skilled green energy labour and to facilitate practical capacity building by increasing the number of skilled workforces in the construction value chain. Within the project, an international consortium developed a modular training material, which can be used for training trainers and professionals (including SME employees, engineers and students). At the national level, ÉMI was expected to train 12 trainers and 50 professionals.

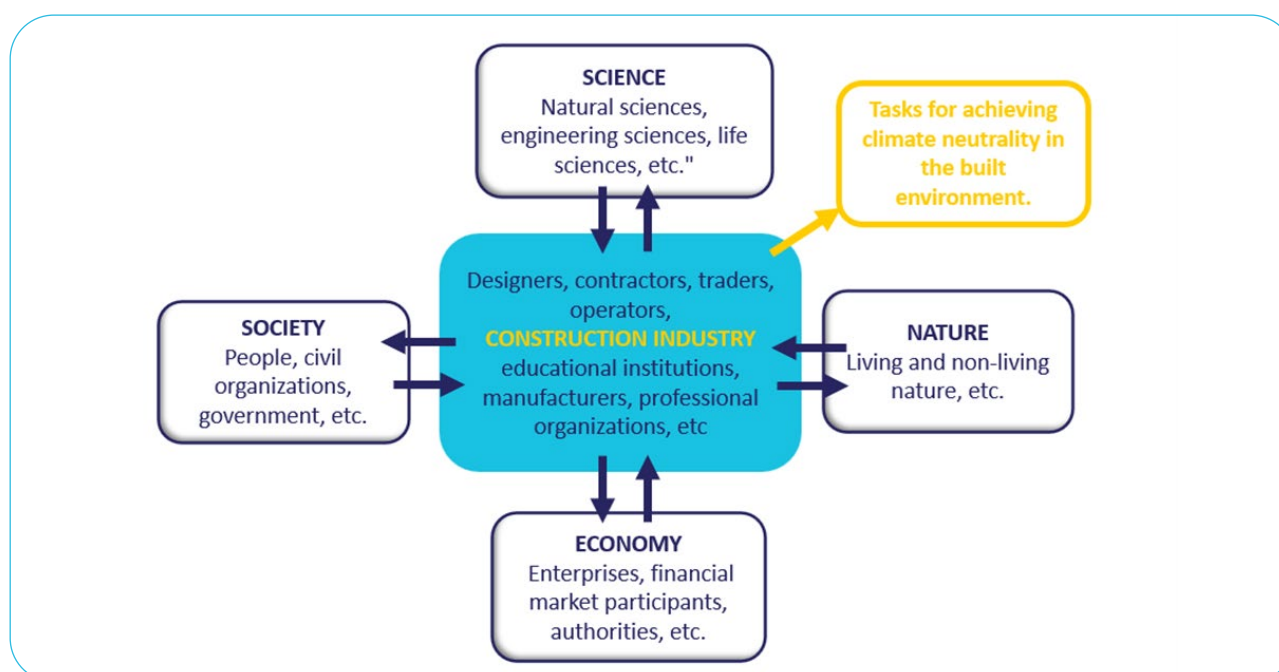
In terms of educational outcomes in Hungary, the [BIMzeED project](#) implemented between 2018 and 2022 with the support of the ERASMUS+ programme is also of significant importance. The project aimed to develop new training materials, methods and opportunities for sustainable building design, construction, and renovation. It aimed to address critical knowledge and competence gaps, especially in the fields of BIM (Building Information Modelling) and nZEB (Nearly Zero Energy Buildings). In the project implemented with Irish coordination, ÉMI Non-profit Ltd. had a role of work package leader and coordinated the training activities. As a result of BIMzeED, several trainings focusing on BIM and nZEB topics were carried out at national level, in which 30 university professors and more than 120 university students successfully participated.

Within the framework of the [TRAIN4SUSTAIN](#) H2020 project coordinated by Geonardo Ltd., an EU standard proposal was elaborated for a measurable and classifiable description of the qualifications and competencies of professionals working in the construction sector, primarily related to the creation of a sustainable built environment (design, construction). The draft standard - [CWA 17939:2022](#) - is an official document published on CENELEC and includes the relevant construction work fields, professions in both engineer and skilled worker categories. The draft standard design, which has a digital version in the form of an online platform ([Skills Registry](#)) with a number of services, contains standard descriptions of more than 1300 Learning Outcomes with competency levels (1-5) related to the listed professions. The Learning Outcome database was compiled as a result of research work covering several European countries, which is the final product of the analysis of both national (engineering and vocational training) and internationally accepted (LEED, DGNB, etc.) qualification schemes.

3.5 Barriers to the achievement of the 2030 targets

The built environment is an integral part of our daily lives and its creation and operation are interconnected with every aspect of our world. The construction industry is the creator of the built environment, playing a crucial role in achieving planned objectives. However, its capabilities and activities depend on these interconnections, and the outcomes are fundamentally shaped by these relationships. The structure of these relationships is illustrated in Figure 7 which indicates that actions can be formulated by considering events outside the construction industry.

Figure 7: Relations of the construction industry



This document updates and expands upon measures formulated in the first national Roadmap developed in the previous phase of BUILD UP Skills in 2013. Given the embeddedness of the construction industry as presented earlier, achieving the set goals requires numerous measures deemed important for achieving results, especially within a short timeframe, as determined by the consortium.

Based on the responses of experts, expert group discussions and interviewees, the following challenges were identified in the Status Quo Analysis:

Structural and policy challenges

- Delays in adopting EU strategies in Hungary.
- Shortcomings of the higher education strategy.
- Frequent changes in the legislative environment.
- Lack of a structured postgraduate education and qualification system.
- Administrative surplus, in the case of dual training.

Challenges related to training programmes

- Shortcomings in teaching materials, lack of digital textbooks and notes.
- Low knowledge of foreign languages.
- Curricular gaps (e.g. principles related to circularity and sustainability, as well as planning, construction and maintenance issues related to renovation).
- Gaps in training for trainers.
- Different standards of dual training.

Human resource-related barriers

- Lack of basic knowledge and basic skills of students.
- Career orientation and guidance is less structured and tends to be more instinctive, often based on emotional factors.
- Low prestige of vocational qualifications.
- Shortage of professionals (due to emigration, few students and a high number of retirements).
- Communication problem with current students.
- Aging of teaching staff.

Economic barriers

- „Costs“ of lost working time due to long training courses.
- Businesses are able to devote fewer resources to the vocational and upskilling of employees.
- Insufficient financing and a lack of government support in vocational and higher education are significant.

These obstacles are closely interlinked and influence one another. Therefore, to achieve meaningful change in the system, all problems must be addressed comprehensively to find effective solutions.

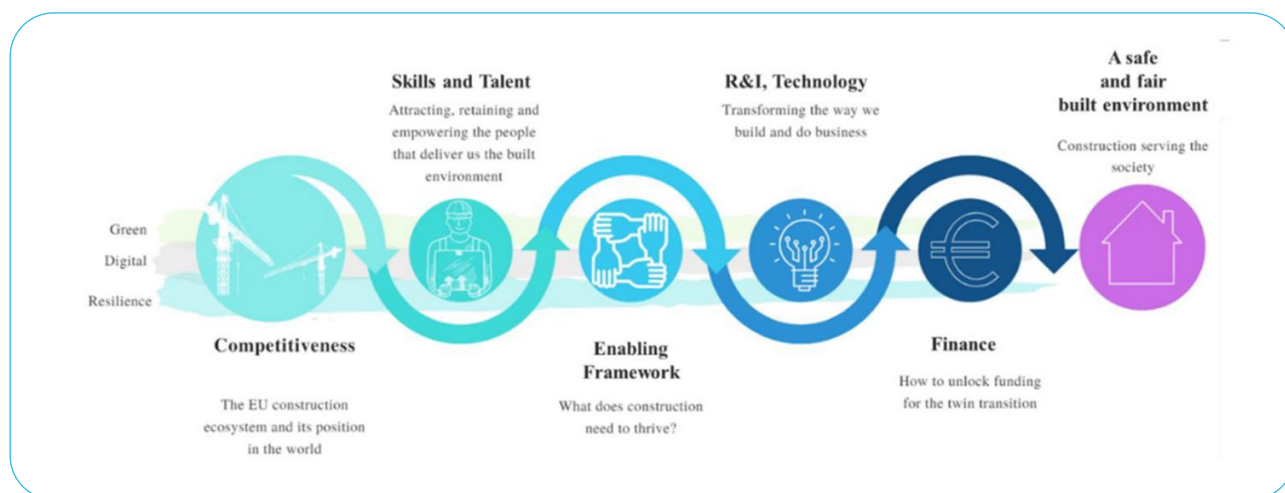
4 GENERAL STRATEGY FOR MEETING QUALIFICATION REQUIREMENTS

4.1 Strategic directions of the Roadmap

The analysis of the current situation drew attention to the fact that it is reasonable to consider the effectiveness of the measures already during the formulation of measures and set the priorities accordingly. In the current project, this means that **we primarily focused on measures related to the content of training and skills development.** Recommendations for establishing the institutional background closely linked to training have been planned only to a limited extent, as their implementation within the short timeframe is not realistic.

When defining the main areas of the new Roadmap, the consortium considered societal needs and expectations, as well as the necessary development, transformation and adaptation of the construction industry. The primary goal is to **achieve human-centred construction, operation and demolition-recycling processes; promote innovative technical solutions; facilitate digital transition, novel business models and standardization of construction processes.** Figure 8 shows one possible path to this process.

Figure 8: The process of human-centered construction



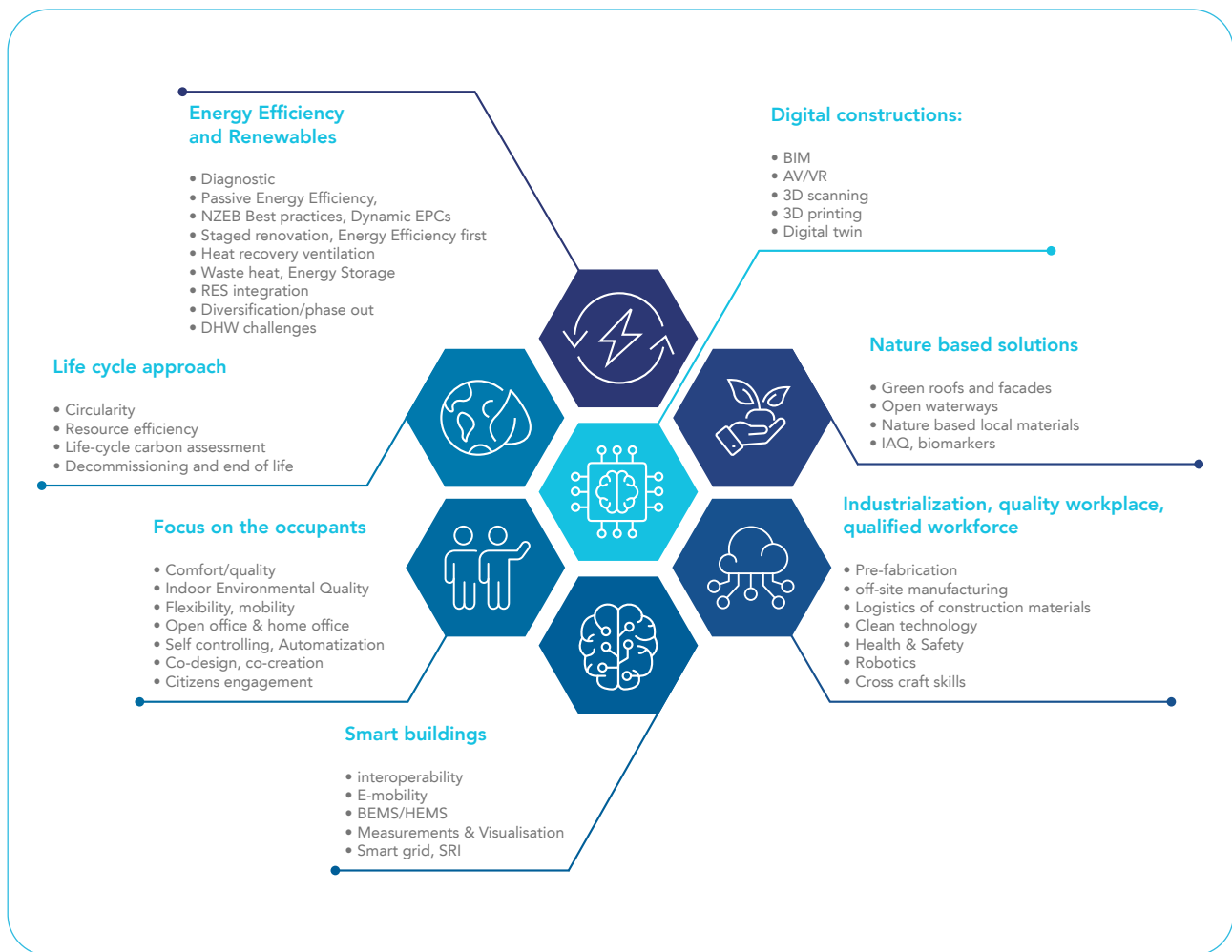
The ConstructSkills4LIFE consortium also took into account the main development directions of the European Union when developing the proposed measures. As a member of the European Construction and sustainable built environment Technology Platform²⁰, ÉMI Non-profit Ltd had the opportunity to follow first-hand the Strategic Research and Innovation Agenda published in October 2023²¹, which reveals and presents future R&D priorities related to the built environment and counteracting the challenges of the construction industry.

²⁰ The European Construction, built environment and energy efficient building Technology Platform (ECTP)

²¹ Strategic Research & Innovation Agenda 2024-2030, ECTP, October 2023

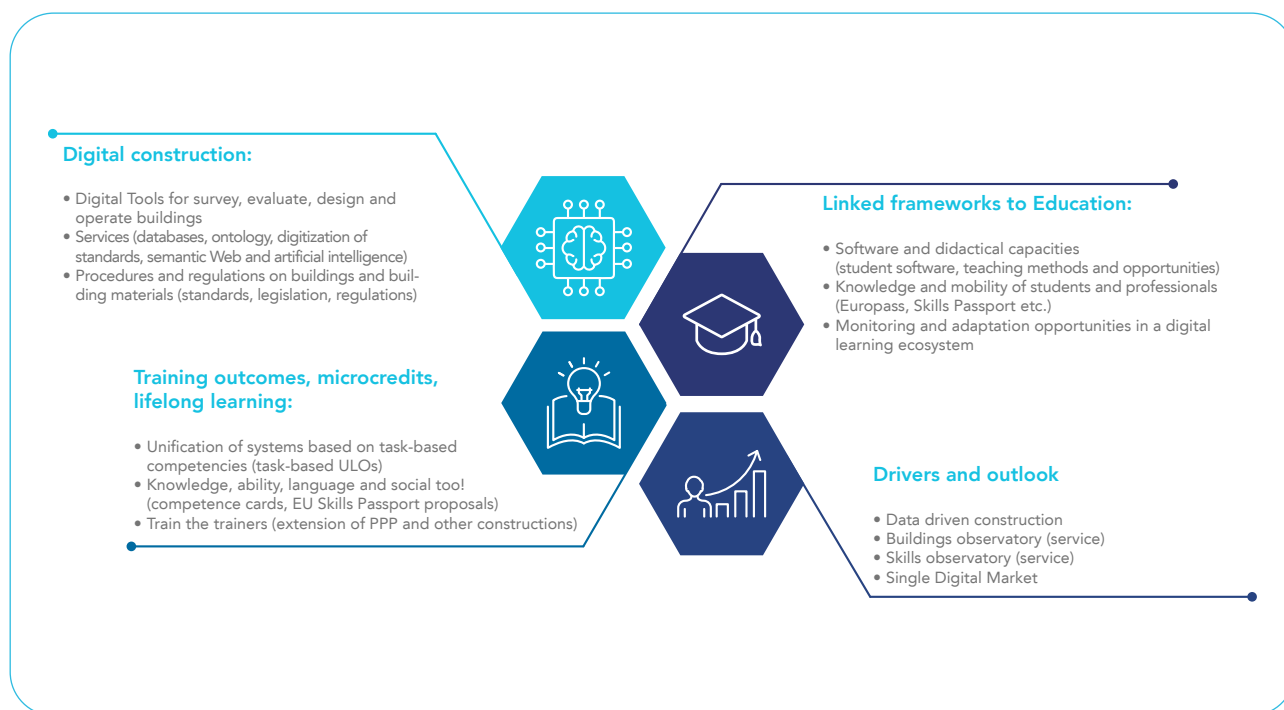
Building on these priorities, the ConstructSkills4LIFE Roadmap identified seven key content elements that are integrated into the development of measures. Figure 9 illustrates the main professional areas centred around topics such as **Energy efficiency and renewable energy sources; Life cycle approach; Focus on the occupants; Smart buildings; Industrialization, quality workplace, qualified workforce; Nature based solutions and Digital construction.** These areas reflect the knowledge necessary for various professionals working in the construction industry.

Figure 9: Content elements of the main technical areas



In addition to acquiring knowledge and skills related to technology, educational technology and organisational areas are equally important, as new methods are needed to effectively transfer the right skills. Figure 10 present the four main elements: **Digital construction; Linked Frameworks to Education; Training outputs, microcredits, lifelong learning and Drivers and outlook.**

Figure 10: Elements of the main educational technology areas



4.2 General strategic areas

During the development of the Roadmap, the evaluation of the previous Action Plan (BUSH 2013) and the current Status Quo Analysis (SQA) generated a number of new ideas, which were systematically organized to outline the main strategic action areas. These are as follows:

A) Policy and strategy

B) Training programmes

C) Human resources

D) Economy and financing

The **policy and strategy measures** deal with the national legal environment, requirements and registration systems affecting the construction industry and its practitioners.

The **training programmes action area is the main focus of this project**, which includes measures related to the training and further education of blue- and white-collar professionals, students and their teachers.

The **human resources** action area discusses the possibilities of motivating people. It aims to encourage both young people who are about to choose a career path and professionals who need further training. Additionally, it includes measures to increase the participation of women and to provide potential retraining opportunities for workers in industries related to fossil fuels.

The financing aspects complementing training programmes fall under the **economic and financial** action area.

The proposed new measures were developed based on the results and experiences of previous proposals (BUSH 2013), formulating both short-term and long-term goals.

4.2.1 Short-term goals

As a short-term goal for achieving carbon neutrality, we consider **measures that provide and ensure the acquisition of knowledge**. The practical application of knowledge and its impact can only have a long-term effect and results. The main areas of short-term goals are:

- Continuation of BUSH 2013 measures based on their evaluation.
- Expanding knowledge on the:
 - Development of training on energy efficiency and integration of renewable energy sources.
 - Challenges of the circular economy, defining and implementing recommended solutions.
 - Spreading knowledge, skills and competences related to natural solutions.
 - Presenting smart solutions, challenges and good examples of smart communities.
- Promoting interdisciplinary, cross-craft cooperation.
- Strengthening legal, business, communication, and competitiveness skills and competencies.
- Developing transparent, easily searchable, task-oriented qualifications and certifications.
- Enhancing and fostering cooperation among construction industry training centres as a network.
- Promoting active language skills and gaining international experience.
- Identifying digital challenges and leveraging opportunities.
- Exploiting local and regional opportunities to meet local needs.
- Making the renovation and construction sectors more attractive to women.
- Retraining of workers and professionals previously or currently employed in fossil fuel-related sectors and regions.
- Attracting young talent to the sector.

4.2.2 Long-term goals

Within the framework of the project, we examined the skills gaps and solutions necessary to achieve the 2030 energy and climate goals, specifically focusing on the construction industry. However, it is important to emphasize that realistic results can only be expected if we consider the **social and economic** contexts that currently define the extensive embeddedness and connections of the construction industry. These are briefly:

- For the future, the application of scientific results and fundamental professional knowledge is crucial. However, achieving the intended results is not possible without their everyday conscious and widespread application. People should not expect results solely from science but rather from their own

active participation. **The key player is not the scientist or the professional but the individual.**

- The goals to be achieved are not independent of social consciousness, which has historically evolved in a distinct national context. The legacy in Hungary (generally the former socialist countries) is the assumption and expectation of a caring role of the state and this also affects everyday attitudes towards carbon neutrality. **People often expect solutions to come from the state.**
- Science and development are important factors in achieving carbon neutrality, but it must be acknowledged that due to its limited opportunities, Hungary is more likely to be in an applicatory role rather than a pioneering one. Nonetheless, given the critical issue of utilizing renewable energy sources, it is the **domestic conditions and knowledge that are most valuable and applicable**, rather than relying solely on foreign achievements.
- Achieving carbon neutrality in the built environment cannot be solely resolved by the construction industry alone. The sector's manoeuvrability is significantly influenced by its social embeddedness, historical, economic, and political relations. Additionally, it depends on the actual building needs of the population, public sector, and businesses. The **demand for carbon neutrality must primarily arise from the „customer“ side.**
- When compiling the Roadmap, the difficulty must also be taken into account that governments typically think in terms of election cycles, while sustainability and achieving carbon neutrality require long-term consistency. Current policies usually promote unlimited possibilities, **whereas sustainability requires certain limitations.**

These challenges also have an impact on training programmes and the measures had to take these circumstances and impacts into account. Therefore, the Roadmap was forced to start from the current conditions but aimed for substantive and organizational development within the consortium to achieve its goals. Social embeddedness and diverse relationships strongly influence the implementation and feasibility of measures, with results typically becoming noticeable only in the long term. Nevertheless, we are proposing measures in these areas as well, precisely because of their long-term impacts and it is advisable to start them as soon as possible.

PRIORITY MEASURES FOR ALL PROFESSIONS CONCERNED

Based on the experience of the consortium partners and their extensive professional network, they were able to assess the skills gaps and tasks to address them. As a result, a number of measures have been proposed which do not only directly address missing skills and competences, but also cover other areas supporting their successful implementation. In total, **thirty measures covering various areas were developed.**

Based on the shortcomings identified in the Status Quo Analysis, the consortium estimated the annual training duration required. These estimations can be considered reliable if the training is conducted by sufficiently trained and well-prepared lecturers in line with the content of the training.

At the qualification levels of the profession, blue- (HuQF 1-5) and white-collar (HuQF 6-8) professionals were discussed separately.

Regarding the content of further training, improving energy efficiency mostly belongs to the architectural field, while the use of renewable energy sources is more relevant in the field of building engineering and building operation. However, in every subject area, it is important to introduce new knowledge discovered by science or accepted through established best practices. Therefore, we addressed innovation as a separate content issue, covering new possibilities in both energy efficiency and renewable energy sources, as well as in training methodologies.

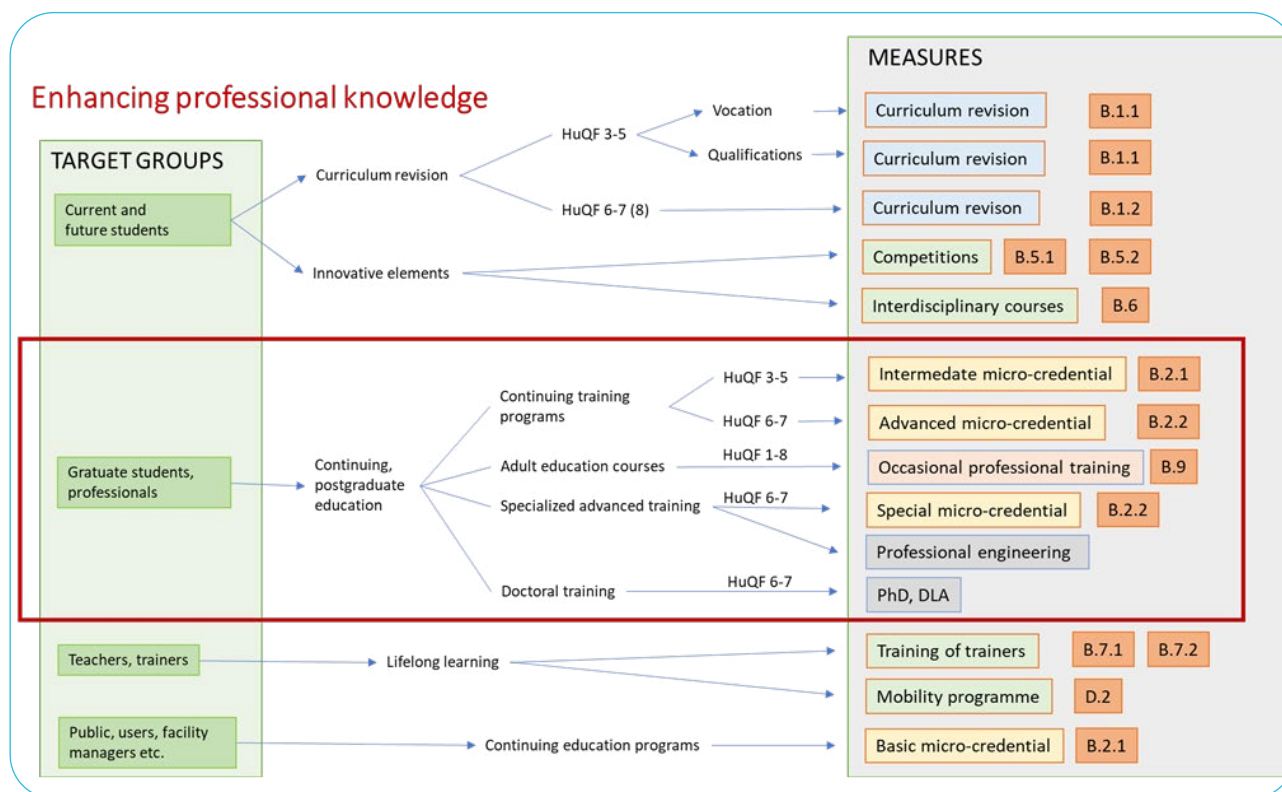
One of the most important conditions for implementing the proposed measures is determining which organisation is best suited to initiate, manage and carry out the tasks at hand. Educational institutions are the primary bodies for skill development, but for adult education and non-school-based training, professional organisations and trade associations also play a key role. Apart from the content-related aspects of skills development, establishing the legal framework, economic interests, and support is a very important task. Social awareness raising is equally important involving the entire educational system and mass media. These tasks are expected from the various government entities, without them the planned goals cannot or can only be partially achieved.

Possible target groups **for increasing skills and knowledge** in order to ensure the sustainability of the built environment are:

- Current and future students.
- Graduates, practitioners.
- Trainers, teachers.
- Users of the building, facility managers, condominium representatives.

We have examined how expertise can be enhanced in these areas through various measures. Improving the knowledge of current and future students involves reviewing and enhancing the curricula of educational institutions, as well as introducing innovative educational elements to further enhance students' knowledge.

Figure 11: Opportunities to increase the quantity and quality of expertise, proposed measures according to target group





In the field of practitioners, the available opportunities for further education and postgraduate training include:

- Continuing education programmes.
- Adult education courses.
- Specialized advanced training.
- Doctoral programmes, training.



Some of these are already existing forms of further training (e.g. specialist engineering or doctoral programmes) but modifying their content to align with carbon neutrality goals may be advisable. Therefore, for consistency, all these are included in the figure above (Figure 10). Note that conferences, professional excursions, and mandatory regulatory training necessary for specific professional tasks have not been depicted in the overview of further education opportunities.

The proposed measures in the areas of Structural and policy (A), Training programmes (B), Human resources (C) and Economic and financial (D) areas are presented in detail below. The Action Plan for their implementation is described in Chapter 6.

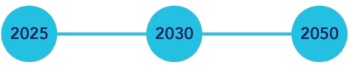

A. POLICY AND STRATEGIC MEASURES



Development of the Hungarian Construction Industry Sustainable Requirements System (A.1)	
Description of the problem	Currently, there is no official document: 1) which has been accepted by the industry through consensus, and 2) includes the essence, details, boundaries, connections and good practices of sustainability as well as ensures measurability.
Objective	Development of the Hungarian Construction Industry Sustainable Requirements System.
Description of the measure	<ol style="list-style-type: none"> 1. Preparation of the background study underpinning the Hungarian Construction Industry Sustainable Requirements System 2. Determination of the form (standard, guideline, other regulations) 3. Extensive professional consultation and discussion of the foundational professional content 4. Finalization and publication of the Requirement System 5. Post-release maintenance and follow-up
Expected result	<p>The professional material establishing the Hungarian Construction Industry Sustainable Requirements System also provides the basis for the textbooks, training materials and print and/or online publications aimed at informing the public.</p> <ol style="list-style-type: none"> 1. Content of the professional material establishing the Requirements System: 1.1 the essence and details of sustainability, 1.2 boundaries and connections of sustainability with related areas, 1.3 description of good practices, 1.4 The relationship between sustainability and quality of life. 2. Content of the Requirements System: a system of requirements based on the foundational professional material, which ensures measurability, provides guidance for the professionals (and the public) and serving as the starting point for developing a fair, non-profit-oriented certification system that can be applied not only to large projects, but also to residential houses.
Timeline 	Priority 
Resources and financial mechanisms	Participants: state bodies, higher education institutions, secondary education institutions, chambers, professional organizations (e.g. ÉMI), other organizations Financial mechanisms: State resource, Funds.
Monitoring and indicator numbers	1 document of elaborated requirements



Stabilisation of the legislative environment (A.2)

<p>Description of the problem</p>	<p>Frequent changes in government programs and legal environment lead to a lack of long-term predictability, for example, in response to the shortage of skilled labour, the Ministry of Economic Development would have allowed professional activities in professions related to the construction industry that were previously subject to qualifications (electrician, tinsmith). Finally, to the satisfaction of those working in the field concerned, the legislation did not enter into force and has been withdrawn.</p>
<p>Objective</p>	<p>In a stable, predictable legal background providing a flexible training environment serving the labour market needs (professional associations would register it on their websites).</p>
<p>Description of the measure</p>	<p>It is necessary to maintain the long term „stability“ of the new vocational training law introduced in 2019, to ensure predictability. There may be a need for sector-specific regulations within the legal framework to support the development of the new training system. This includes defining the validity and qualifications of micro-certificates, as well as addressing their funding mechanisms (e.g., individual learning accounts), among other considerations.</p>
<p>Expected result</p>	<p>It concerns the scope of legislation concerning vocational training and adult education. Training pathways can be recommended for achieving construction industry qualifications based on a predictable legal framework. The predictable legal background includes the „two professions and one vocational qualification“ provisions which ensures free vocational training laid down in the Act on Vocational Training.</p>
<p>Timeline</p> 	<p>Priority</p> 
<p>Resources and financial mechanisms</p>	<p>The possibility for obtaining „two professions and one vocational qualification“ free of charge contributes to ensuring a sufficient number of skilled workers. Additionally, depending on academic performance, the state fully finances up to 12 semesters of education for students in higher education. The financial resources for this should be provided in the state budget.</p>
<p>Monitoring and indicator numbers</p>	<p>Number of graduates in adult education and training. Legislation in force on the websites of professional associations.</p>

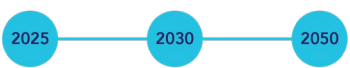

Defining compulsory qualifications (A.3)

Description of the problem	<p>There is a lack of a consistent framework for defining the roles and responsibilities of personnel throughout the entire life cycle of buildings, including their hierarchical structure and required qualifications. This gap includes the identification of necessary qualifications and supervisory roles for individuals who influence the energy efficiency and environmental aspects of planning, constructing and operating new or renovated buildings funded by state or EU resources.</p>
Objective	<p>Ensuring that individuals working in personally responsible positions and employed by legal entities possess up-to-date professional skills requires the enforcement of regulatory or quasi-regulatory qualifications regulated by authorities. This ensures that these personnel maintain up-to-date professional skills and apply them responsibly and accountably.</p>
Description of the measure	<p>Based on existing or forthcoming legislation, professional suggestions and consensus, it is important to identify the activities (based on Hungarian Standard Statistical Classification of Economic Activities- TEÁOR), responsible positions (based on Hungarian Standard Classification of Occupations- FEOR), positions (legal personality, employee status) that significantly impact achieving the desired energy and environmental goals. Additionally, the content and methods of mandatory regulatory or quasi-regulatory qualifications and skills for these individuals/personnel should be defined and harmonized within the construction industry.</p>
Expected result	<p>The proposed measure encompasses the entire life cycle of all facilities within our built environment, addressing every professional and non-professional level. It includes requirements for professional skills, qualifications and certifications specific to each role, covering aspects such as professional, business, pedagogical, energy and environmental knowledge and further training expectations.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>State, professional organizations</p>
Monitoring and indicator numbers	<p>Amended or new legislation, published professional materials on the description of qualifications.</p>



Graduate Career Tracking System for the construction sector (A.4)	
Description of the problem	In the construction industry, crucial decisions are often made without a solid foundation due to the lack of reliable data on the professional preparedness and skills of industry participants.
Objective	Registration of graduates of the construction sector and related fields.
Description of the measure	Creating a database that records university graduates and their further education. The Construction Graduate Career Tracking System (CGCTS, in Hungarian: ÉDPR) could operate as part of the Graduate Career Tracking System (GCTS, in Hungarian: DPR) established by law. The CDPR would best be built within the framework of the Educational Authority linked to the DPR's IT system.
Expected result	The proposed measure constitutes a personal database for construction industry professionals. The measure does not directly address the content of skills development but aims to enhance the robustness and effectiveness of skills development measures.
Timeline	Priority
	
Resources and financial mechanisms	The database should primarily be operated as a task of the professional chamber(s), driven by sectoral interests and supported by government funding. Its revenues can be derived from user fees for accessing the database.
Monitoring and indicator numbers	Established database and online interface accessible to stakeholders.

Review of the entitlement systems (A.5)	
Description of the problem	The current certification and authorization systems (often non-existent) for market participants and businesses in the construction industry do not compel companies to ensure that they have adequately competent personnel and the necessary resources for their work. This results in a failure to maintain up-to-date knowledge among their staff and to meet the expected quality and standards in their tasks.
Objective	The current institutional system of authorizations for market participants involved in the creation and maintenance of the built environment needs to be reviewed. A proposal should be developed for the operational conditions and institutional framework of a unified certification system for specified participants involved in building energy efficiency and environmental protection throughout the entire lifecycle of the facilities.
Description of the measure	The review of authorization systems for non-legal entities (human resources) and the professional structuring based on FEOR will enable the establishment of strategic expectations for personnel qualifications, defined by profession and HuQF level. This includes mandatory and voluntary training and qualification systems. For legal entities in the construction industry, a similar review of voluntary business qualification systems and/or regulatory eligibility systems will be necessary. In formulating the strategy, it is crucial to develop a unified qualification requirement system for entrepreneurial activities. Special attention should be given to the conditions for obtaining independent operational licenses and the requirements for entrepreneurial master exams.
Expected result	A proposed new comprehensive certification and entitlement system for the entire construction industry should cover both legal entities and non-legal entity market players. It should encompass all stakeholders involved throughout the lifecycle of the built environment, ensuring lifelong competency maintenance, professionally expected job performance, and accountable delivery.
Timeline	Priority
	
Resources and financial mechanisms	It can provide partial self-financing, but EU or governmental financial and legal support is also required.
Monitoring and indicator numbers	Elaborated eligibility system implemented in a regulation or legislation.



Inventory of the built environment (A.6)

Description of the problem	There is currently no suitable monitoring system for recording, managing, and assessing data related to the built environment's subsystems (construction, building technology, electrical systems) throughout their entire lifecycle. This data is crucial for energy efficiency, environmental protection, inspections, reviews, and evaluating the effectiveness of governmental measures. Furthermore, it is essential for verifying the qualifications and compliance of involved personnel.
Objective	To create a digital, online-accessible registry system capable of collecting, storing, and evaluating data relevant to building energy efficiency and environmental protection. This system should be designed to integrate with existing systems and be coordinated with qualification and authorization records. It will manage data related to construction, commissioning, operation and decommissioning of buildings.
Description of the measure	The monitoring system handling relevant construction, commissioning, operation, and decommissioning data of our built environment must be established by integrating, coordinating, and complementing existing systems in a manner aligned with the qualification registration system.
Expected result	According to defined facility size, ownership and financial resources, the built environment can gradually expand into key areas and an inventory can provide meaningful data for both operators and government bodies enhancing transparency and accountability.
Timeline 	Priority 
Resources and financial mechanisms	It can provide partial self-financing, but EU or governmental financial and legal support is also required.
Monitoring and indicator numbers	Established database and online interface for data accessibility.



Development of construction careers (A.7)

Description of the problem	<p>The content and structure of the Hungarian Standard Classification of Occupations (FEOR-08) was substantially renewed in 2008. However, its structure does not include current education programmes, the professional hierarchy aligned with HuQF levels based on further training following professional qualifications and the names of occupational fields related to entitlements do not meet present and future professional expectations.</p>
Objective	<p>With the elaboration of the Career Pathway Models and the restructuring of FEOR in relation to the construction industry, a profession/specialisation-specific systematization methodology can be established. This methodology can serve as the basis for a unified approach to school-based and further education, certifications and qualifications. It aims to ensure comprehensive coverage of human resource needs of the market and in the longer term to ensure the appropriate number and composition of human resources.</p>
Description of the measure	<p>In order to modernise the (75) chapters of the FEOR related to the construction industry, it is necessary to review and construct the Career Pathway Model of individuals in specific professions. It should be done in cooperation with professional organisations and chambers. These models will track competence requirements linked to HuQF levels and specific activity entitlements. By considering these requirements, we can develop a new FEOR structure and define the scope of occupations linked to entitlements.</p>
Expected result	<p>The proposed measure covers the entire building construction industry, all levels of the HuQF and all phases of the life cycle of facilities. Its substantive content and result would be the methodological basis of the establishment of a uniformly operated and controlled authorization system, which ensures the upbringing of market participants and qualified human resources with up-to-date knowledge and qualification in accordance with market needs and ensuring their availability in terms of time and location.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>It can also provide partial self-financing from qualification and registration fees, but EU or governmental financial and legal support is also required.</p>
Monitoring and indicator numbers	<p>Career models developed for professions; career models published by professional organizations.</p>



Complex registration system in the construction industry (A.8)

Description of the problem	The current qualification and authorization system for players in the construction market, including companies and their employees, is mostly non-existent or inadequate. There is no unified institutional framework or integrated digital portal for supporting, accessing, applying, tracking and monitoring qualifications, authorizations and the outcomes of activities.
Objective	Establishing a system for monitoring the rights of operators involved in the design and maintenance of the built environment, as well as the activities carried out and the results achieved at the affected facilities.
Description of the measure	The introduction of the new authorization tracking and comprehensive registry system, building upon the outcomes of the Train4Sustain project, aims to enhance the mandatory training and authorization records for all relevant construction professions related to energy efficiency. This initiative includes implementing a „professional passport“ (such as EuroPass, Skillsregistry) to ensure easy application and accessibility. The system will define career pathways, structure professional competencies based on the FEOR classification and set strategic expectations for personnel qualifications. It will also oversee the direction of mandatory and voluntary training and certification systems, ensuring the operation and regulatory oversight of up-to-date authorization systems for legal entities within the construction sector.
Expected result	The proposed new system, which encompasses the entire construction industry, applies to both legal entities and non-legal entity market participants. It covers all stakeholders involved throughout the entire lifecycle of the built environment, ensuring lifelong competence development, professionally expected performance and accountable, measurable outcomes.
Timeline 	Priority 
Resources and financial mechanisms	It can provide partial self-financing, but EU or governmental financial and legal support is also required.
Monitoring and indicator numbers	Description of the operator of the registration system in legislation. Established system (1 pc.).



Skills and competence development website (A.9)

Description of the problem	<p>The development of skills and competencies in the construction economy currently focuses narrowly on market-based solutions to address immediate issues. Depending on their resources, economic stakeholders may or may not be able to plan further into the future. When they do, they confront the complex challenges of the future. However, navigating these challenges is hindered by the lack of a comprehensive and cohesive source of information to strengthen their intentions and reinforce decisions.</p>
Objective	<p>Establishing an informative platform that presents existing, up-to-date information and supports foresight in the field of skill and competence development within the construction economy.</p>
Description of the measure	<p>Creating a website that provides orientation and concrete information for stakeholders in the construction economy. The website can be based on the measures outlined in the current project and expand upon them, offering specific training recommendations and showcasing regulatory and economic background opportunities. The website will be suitable for continuously monitoring the project's measures and serving as an appropriate background for necessary interventions.</p>
Expected result	<p>The proposed website focused on the construction economy, will present opportunities and trends related to skill and competence development, adapting dynamically to continuously changing circumstances. With an interactive design, the website will serve as a comprehensive and active workspace, addressing a wide range of tasks from handling specific issues to solving the duties of training and regulatory institutions.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Governmental resource - Following the grant application or contract, the necessary funds must be made available in a phased manner to the organization responsible for the implementation and operation of the website.</p>
Monitoring and indicator numbers	<p>Public website, accessible by everyone to monitor progress. For government and market supporters, documented tracking can be required for development or expansion activities. Digital technology facilitates this easily by tracking metrics such as the number of website visitors.</p>

B. MEASURES FOR TRAINING PROGRAMMES



Revision of the curriculum (training and learning outcome requirements) at HuQF 3-5 (B.1.1)	
Description of the problem	The training requirements for professions (registered of vocational occupations) and vocational qualifications (with programme requirements) related to the construction industry do not contain minimum knowledge requirements in the topics of energy efficiency and circular construction.
Objective	Training requirements for professions and qualifications in the construction sector should include minimum knowledge requirements on energy efficiency and circular building models.
Description of the measure	Development of Training and Learning Outcome Requirements and Programme Requirements: training and output requirements and programme requirements need to be reviewed and possibly new programme requirements may be created. By incorporating new knowledge, graduates of professions related to the construction industry will have minimum knowledge level competencies in the so far missing topics.
Expected result	It is necessary to review professions and programme-required qualifications related to the construction industry and to formulate the minimum competences at the level of knowledge in the field of energy efficiency and circular construction. In professions where it is necessary to achieve knowledge-level competence in the given topic, they can be acquired in shorter-term further training courses (micro-certifications).
Timeline	Priority
	
Resources and financial mechanisms	State resources: The review and development of new requirements may be recommended by sectoral skills councils; the cost will be covered by the designated ministry or Hungarian Chamber of Commerce and Industry. The Sector Skills Councils and the Innovative Training Support Centre Plc. are responsible for the ongoing review of Education Training and Learning Outcomes Qualification Requirements and Programme Requirements and therefore do not mean additional costs.
Monitoring and indicator numbers	The training and learning output requirements of the professions and the programme requirements for vocational qualifications are registered on the website of the Innovative Training Support Centre Plc.

Revision of the curriculum (training and learning outcome requirements) at HuQF 6-7 (B.1.2)

Description of the problem	Training and Learning Outcome Requirements for Higher Education do not include competencies related to the knowledge and practice of principles related to circularity and sustainability.
Objective	Defining and ensuring the inclusion of knowledge and skills related to circularity and sustainability principles for students in higher education. Since the Educational Authority is responsible for the registration, initiation and modification of higher education institutions, as well as changes in the register. This process needs to be led by the Authority with additional involvement of other authorities, such as the Higher Education Planning Board, Hungarian Higher Education Accreditation Committee and National Doctoral Council.
Description of the measure	<ol style="list-style-type: none"> 1) Formulating the expectations of the state and the maintenance authorities on the above topics in line with the climate neutrality targets that have been agreed. 2) Consultations with competent authorities and decision-makers to ensure that university courses are aligned with the national strategy. 3) Development of strategies of higher education institutions in the field of climate change and sustainability education. Establishing effective communication channels and platforms between students, lecturers, researchers and administrative staff, and organizing regular forums with the participation of the university community. 4) Review of existing training and output requirements: Conducting a detailed assessment of current Training and Output Requirements by identifying information in the areas of climate change and sustainability. 5) Development of new requirements integrating circularity and sustainability principles, taking into account state expectations and maintenance goals. To compile it, involve university and non-university professionals.
Expected result	The institution will have long-term sustainable training programmes that are better suited to climate change and sustainability challenges. The institution improves its reputation and attractiveness in the fight against climate change and in support of sustainable development.
Timeline 	Priority 
Resources and financial mechanisms	Sponsorship, governmental support, own budgetary resources
Monitoring and indicator numbers	Publication of revised requirements on the website of the higher education institution, Alumni graduate tracking questionnaire, monitoring of graduates' careers and sustainability engagement.

Development of (further) training programmes for sustainability in the construction sector at HuQF 3-5 (B.2.1)

Description of the problem	The training requirements for professions (registered of vocational occupations) and vocational qualifications (with programme requirements) affecting the construction sector do not contain minimum knowledge requirements in the field of lifecycle-based circular economy considerations in construction and operation.
Objective	<p>Training requirements for professions and qualifications in the construction sector should include minimum knowledge requirements in the following areas:</p> <ul style="list-style-type: none"> • sustainability in the construction sector; • circular economy, lifecycle approach; • smart solutions, smart cities and communities; • the possibilities of nature-based building materials and nature-based solutions, • deep renovation of buildings and best practices; • renovation of historic buildings and best practices; • digitalization.
Description of the measure	Development of Training and Learning Outcome Requirements and Programme Requirements: It is necessary to review of training and outcome requirements and programme requirements and to develop a system of shorter-term training courses (micro-credentials) for those already holding vocational qualifications.
Expected result	In construction industry related vocational qualifications with programme requirements and in professions (micro-credentials) it is necessary to achieve knowledge-level competence in the topics specified above.
Costs and benefits	The Sector Skills Councils and the Innovative Training Support Centre Plc. are responsible for the ongoing review of Education Training and Learning Outcomes Qualification Requirements and Programme Requirements, therefore it do not entail additional costs. The preparation of shorter-term training programmes and the implementation of further training are included as costs. The cost of preparing the programmes is borne by the adult educator, while the cost of further training is borne by the trainee (or his/her employer). It is sometimes possible to involve EU funds for the implementation of trainings. The benefit of implementing the measure, incorporating new knowledge, is that graduates of professions related to the construction industry will have a minimum level of knowledge in the lacking subject area. By upskilling of professionals, they will have the skills necessary for the level of competence of the professions concerned in the field of lifecycle-based circular economy considerations into construction and operation.
Internships/apprenticeships of the trainees	The knowledge of the missing topics must be integrated into the professional programme of the 3-year vocational school, the 5-year technical school and the 2-year technical training, so it does not entail additional training time. For graduates/practitioners, shorter training courses ending with a „micro-credential“ could be provided, ranging from 8 to 120 hours, depending on the topic and training level.
Multidisciplinary skills and knowledge	New knowledge can be integrated into the curriculum of several professions and qualifications. The combination of micro-credentials can also lead to a vocational qualification.
Entry requirements, qualification levels and certification of trainees	As new knowledge is integrated into the requirements of professions and qualifications, entry requirements and qualification levels are the same as those of the profession or professional qualification. For shorter-term trainings - ending with a micro-certificate - a profession related to the construction industry may be prescribed as an entry requirement.

Selection and accreditation of trainers and quality control	<p>Only vocational schools are authorized to teach vocations. Vocational qualifications are offered at state-funded vocational schools, while partial qualifications can be obtained from adult education providers for a fee. Vocational schools can collaborate with dual partners for teaching vocational qualifications (regarding the Register of vocational occupations- SZJ), but the training provider and the site must get accreditation from the local chamber of commerce. The Act on Vocational Education and Training requires VET schools to have and operate a quality management system. Short-term training programmes (micro-credentials) can be carried out by adult education providers who have the appropriate training programme, as well as the necessary personnel and resources.</p>
Certification rules and requirements for construction companies and installers	<p>The number of employees with the appropriate qualifications significantly influences a company's operational scope. Therefore, maintaining a training system that adapts to changing regulations is essential. If a company wishes to participate in dual training programs, it must obtain accreditation from the local chamber of commerce.</p>
Incentives and drivers	<p>The state supports the acquisition of two professions and one vocational qualification. Full-time students of the SZJ profession receive a scholarship, participants in dual training receive a salary based on a VET employment contract and are eligible for a one-time start-up grant upon successful completion of their professional exam. By completing short-term trainings (obtaining micro-credentials), professionals in the construction industry can fulfil their continuing education requirements for the specified period.</p>
National registers	<p>The Education Training and Learning Outcomes Qualification Requirements (KKK) for each profession and the Programme Requirements (PK) for vocational qualifications are registered by the Innovative Training Support Centre Plc. The register of short-term training programmes and micro-credentials should also be registered on the website of the Innovative Training Support Centre Plc. (or sectoral professional organisation).</p>
Financing and administration	<p>The review and development of new requirements may be recommended by the sectoral skills councils, the cost of which will be borne by the designated ministry or Hungarian Chamber of Commerce and Industry. To implement shorter training courses, according to current adult education regulations, the responsibility (and cost) for developing training programs lies with the adult education provider. If the training is organized under an official training framework, the cost of developing the program is borne by the relevant authority, while the participant (or their employer) is responsible for the costs associated with the training and examination.</p>
Institutionalisation of the proposed systems	<p>The process of reviewing Education Training and Learning Outcomes Qualification Requirements and Programme Requirements is regulated. Rules for the development, acceptance and validity of micro-credentials should be developed.</p>
Timeline 	Priority 



Resources and financial mechanisms	<p>The review of KKKs shall be financed from public resources. The development of program requirements can be financed through grants or by the entity submitting the requirements. The regulation of micro-credentials is the responsibility of government and/or chambers of commerce. The financing of the preparation of shorter-term training programmes - in the absence of grants or state resources - must be provided by adult educators, which can later be recovered through training fees.</p> <p>While developing continuing education programmes incurs costs for adult educators, they can expect to generate revenue from running these programmes. Training for employees in construction companies involves expenses, unless grant funding is obtained.</p>
Accompanying measures	<p>Once further training programmes have been developed, the relevant professional organizations should inform employers about the available training opportunities.</p>
Planned certification and accreditation	<p>If the micro-credentials system is regulated, it is worthwhile/necessary to standardise further training programmes at national level (in terms of content, requirements, levels and validity).</p>
Structural measures	<p>Regulation of the micro-credential system.</p>
Monitoring and indicator numbers	<p>Number of micro-certificates advertised. Number of participants.</p> <p>The register of training programmes offering micro-credentials will be published on the website of the Innovative Training Support Centre Plc. or a relevant professional organization in the construction industry, enabling the tracking of the number of programs. The number of participants in adult education is registered in the Adult Training Data System (FAR system).</p>

Development of (further) training programmes for sustainability in the construction sector at HuQF 6-7 (B.2.2)

<p>Description of the problem</p>	<p>Curricular deficiencies in university education: it does not sufficiently emphasize the principles, knowledge and design tools related to sustainability and circularity in planning, construction, and operation. Traditional educational models - partly due to the significant time required for curriculum development and accreditation - can only follow labour market changes and needs very slowly. Therefore, there is a need for more flexible and shorter training programmes, which are typically implemented outside the formal education system, and are primarily intended to expand the knowledge of professionals in the field.</p>
<p>Objective</p>	<p>Practitioners should gain relevant knowledge at a level suited to their prior qualifications and job roles through shorter further training programmes (e.g. micro-credential). A micro-credential is a more flexible, modular form of continuing education designed to provide learners with specific knowledge, skills, or competencies that meet current or future labour market demands. The micro-credential is portable and can be integrated into larger certifications or qualifications. It can be earned before, during, or after higher education and offers a new way to validate acquired competencies.</p>
<p>Description of the measure</p>	<p>1. Analysis of study programmes: Review and analysis of university degree programmes on topics related to energy awareness, lifecycle-based, circular economy considerations and related topics in design, construction and operation. 2. Overview of micro-credential systems in EU (higher) education institutions and adaptation of good examples. 3. Development of a micro-credential system for the continuing education of practitioners. It should be examined how it can be integrated into master's or engineering programmes.</p> <p>Content of the proposed action:</p> <ul style="list-style-type: none"> • Courses and trainings: The introduction of a micro-credential system involves the development of new courses and trainings that focus on specific skills and topics. • Evaluation system: An effective assessment system will be developed reflecting the skills and performance required to obtain micro-credentials.

<p>Expected result</p>	<p>Recommended topics for micro-credentials:</p> <p>A. Sustainability Knowledge of sustainability and energy efficiency related to the construction industry. Presenting successful domestic and international examples through lectures, possibly including building visits. The buildings are described in a comprehensive manner (architecture, building engineering, energy and building electricity). By examining these specific examples, participants will gain insights into current technologies and their potential applications.</p> <p>B. Circular economy The operation of a life cycle-based, circular economy will be explained. This includes an introduction to Life Cycle Assessment (LCA) methods for evaluating buildings throughout their entire lifespan. Available software and databases will be presented, along with example calculations and sample tasks.</p> <p>C. Smart solutions Presentation of smart devices that can be used during the operation of buildings, possibilities of their systemization and control. Sample tasks. Smart cities and communities. Presentation of realized good examples.</p> <p>D. Natural building materials, recycling Description of natural building materials, possibilities and limitations of their application: building structure and legal regulations. Recycling of building materials from demolition. Building visits. Visiting building materials testing laboratories.</p> <p>E. Deep renovation Possible solutions for the energy modernization of buildings (at structural, mechanical level), by analysing the economic effects of each option, focusing on the locally available (whether recycled, reused) building materials / construction products. Analysis of implemented projects, description of the methodology of post-occupancy evaluation. Design task.</p> <p>F. Renovation of listed historical buildings Description of the typical structural and mechanical systems of listed buildings. Building energy requirements. Possible renovation scenarios and solutions. Installation options for renewable energy sources. Realised examples.</p> <p>G. Digitalization Basic principles and practical applications of Building Information Modelling (BIM), including parametric modelling of objects and structured management of building-related data. Learning about dynamic building simulation software (such as EnergyPlus or IES VE) that can be used to model and optimise the energy performance of buildings. Learning about virtual reality and augmented reality (VR/AR) devices. Robotics, drone technology, 3D printing.</p>
<p>Costs and benefits</p>	<p>Expenses:</p> <ul style="list-style-type: none"> • Curriculum development: time educators spend on developing course materials and the resources needed for designing the curriculum. • Technology infrastructure: Deployment of online platforms and assessment systems. Acquisition of new technological equipment, development and maintenance of infrastructure. • (Further) training of trainers and experts, support for participation in conferences. • Marketing and communication to promote the course. <p>Benefits:</p> <ul style="list-style-type: none"> • Increasing skills: students can find employment in the labour market more easily through micro-credentials with specific skills. • Flexible form of continuing education: The system is more attractive to students as it can be customised and promotes lifelong learning. • The Hungarian Chamber of Engineers and the Chamber of Hungarian Architects recognize the acquired micro-credentials as further training. • Interdisciplinary, professions working together: students of the course are not separated by profession (only according to EQF levels), thus facilitating cooperation between professions.



Internships/apprenticeships of the trainees	<p>Micro-credentials can be complemented with internship programs, allowing students to apply their learned skills to real-life assignments.</p>
Multidisciplinary skills and knowledge:	<p>See description of individual micro-credentials.</p>
Entry requirements, qualification levels and certification of trainees	<p>Students entering the field, adapted to the level of the micro-credential, must possess certain basic skills that are relevant to the chosen micro-credential field.</p> <p>Qualification levels and entry requirements for micro-credentials:</p> <ul style="list-style-type: none"> • Basic micro-credential: For those looking for entry-level knowledge in a specific field. No special prior training is required. (e.g., for beginners or laypersons) • Intermediate micro-credential: For participants who already have basic knowledge and seek more in-depth, intermediate knowledge. Entry requires prior experience, qualifications, or completion of relevant courses. (HuQF 3-5) • Advanced micro-credential: For professionals seeking higher levels of expertise. Prior professional training, experience or higher education may be required to participate. (HuQF 6-7) • Special micro-credential: Requires specific professional or expert-level qualifications for participation. (expert, graduate, HuQF 7-8) <p>According to Act CCIV of 2011 on National Higher Education in force, these programmes are considered a partial knowledge training, meaning students are enrolled in the respective higher education institution and receive a micro-credential upon successfully completing the course.</p>
Selection and accreditation of trainers and quality control	<p>Micro-credentials can be offered by higher education institution, professional organization, chamber or accredited adult training institution, depending on the qualification level. Quality control involves re-evaluation of selection parameters every 5 years.</p>
Incentives and drivers	<p>For full-time students, scholarships can be paid and part of the course tuition fee can be reclaimed.</p>
National registers	<p>The Educational Authority keeps records of the nationally available micro-credential training system. A person's micro-credentials and other training certificates and diplomas can be registered in an „Individual Learning Account“ database.</p> <p>Micro-credentials can be integrated into the European Credit Transfer and Accumulation System (ECTS) and can be displayed in NEPTUN and the Adult Education Data Reporting System.</p>
Financing and administration	<p>Financial support (pre-financing) is required to create the curriculum for each micro-credential. The training includes online and/or classroom lectures and consultations, so resources are also needed to ensure the necessary IT infrastructure.</p>

Institutionalisation of the proposed systems (e.g. recognition)	<p>After completing the course, one will receive an independent micro-credential, but after completing a certain number of micro-credentials that fit into a certain topic, a „summary qualification“ can be obtained (e.g. specialist engineer), the conditions have to be set in advance.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>The organization and execution of training require a coordinated use of central and business resources. It can be corporate capital, for whom this is also a promotional platform, or the training institution’s own resource, or a domestic or EU grant sources. Tuition fees paid by participating students represent income.</p>
Accompanying measures	<p>Once further training programmes have been developed, the relevant professional organizations should inform employers about the available training opportunities.</p>
Planned certification and accreditation	<p>Through cooperation between construction sector participants and regulatory authorities, developing quality standards and specifications that define the expectations of the operation and products of microcredit institutions. Involve independent organisations in the evaluation of micro-credential programmes.</p>
Structural measures	<p>Regulation of the micro-credential system: it is worthwhile/necessary to standardise further training programmes at national level (in terms of content, requirements, levels and validity).</p>
Monitoring and indicator numbers	<p>Number of announced micro-credentials, number of participants.</p>



Training of building operators and the public (B.3)

<p>Description of the problem</p>	<p>One of the most important segments of adult education involves addressing the responsibilities and „qualifications“ of non-professional investors, building owners, occupants and building operators (such as the general public, condominium representatives). These groups are considered key societal entities from the perspective of building energy efficiency and environmental impact.</p>
<p>Objective</p>	<p>The aim of the measure is to develop training programmes for representatives and building authorities:</p> <ul style="list-style-type: none"> • Empowering condominium representatives: Ensure that building owners and representatives have a detailed understanding of energy efficiency and sustainability principles and are able to apply them effectively in their daily tasks. • Raising awareness among non-professional investors and the public: Increase the awareness of residents and representatives of condominiums about the energy efficiency of their buildings and their environmental role.
<p>Description of the measure</p>	<p>1) Development of a training programme. 2) Development of a support system: create online or offline support system, where members can obtain further information and assistance on emerging issues, as well as exchange experiences and ask questions. Content of the proposed action: Training based on lectures, practical case studies, expert discussions and workshops.</p>
<p>Expected result</p>	<p>Training modules:</p> <ol style="list-style-type: none"> 1. Basic knowledge: <ul style="list-style-type: none"> • Introduction to the concepts of energy efficiency and sustainability. • Understanding the relationship between energy use and environmental effects. • Overview of various energy-efficient technologies and solutions. 2. Duties and responsibilities: <ul style="list-style-type: none"> • A detailed overview of roles and responsibilities of representatives in energy efficiency measures. • Presentation of the most important energy efficiency tasks and actions in the field of building maintenance and operation. 3. Legislative environment and regulation: <ul style="list-style-type: none"> • An overview of relevant laws and regulations that have an impact on the sustainability and energy performance of buildings. • The importance and requirements of compliance with energy efficiency regulations. 4. Practical tools and solutions: <ul style="list-style-type: none"> • Analysis of practical case studies on the benefits and challenges of energy efficiency measures. • Presenting concrete tools and solutions for improving energy efficiency.
<p>Costs and benefits</p>	<p>Expenses:</p> <ul style="list-style-type: none"> • Preparation and distribution of training materials. • Accreditation costs. • Inviting and paying trainers and experts. • Development and maintenance of online platforms and support systems. <p>Benefits:</p> <ul style="list-style-type: none"> • Building owners and representatives have a better understanding of the importance of energy efficiency and sustainability. • The sustainability of buildings is improving, contributing to the achievement of environmental goals. • Condominiums and non-professional investors are able to address energy and sustainability issues related to their buildings more effectively.

<p>Multidisciplinary skills and knowledge</p>	<p>Technical knowledge: Participants will learn about technical aspects of energy consumption and efficiency in buildings, including heating, ventilation and air conditioning systems, energy production methods, etc.</p> <p>Environmental knowledge: Understanding the impact of human activities on the environment and the importance of energy efficiency and sustainability for environmental protection.</p> <p>Regulatory knowledge: Gaining detailed knowledge of environmental and energy efficiency legislation and regulations which must be considered and applied when operating and renovating buildings.</p> <p>Economic and financial knowledge: Understanding the financial and economic aspects of energy efficiency investments, including payback periods, support options and analysis of investment costs.</p> <p>Social and community skills: Being able to work effectively with different groups and communities to implement energy efficiency initiatives and support community participation and collaboration.</p>
<p>Entry requirements, qualification levels and certification of trainees</p>	<p>Entry requirement: applicants must have at least secondary education.</p> <p>Qualification levels:</p> <ul style="list-style-type: none"> • Basic qualification: This training provides a lower level of basic knowledge and skills in the field of energy efficiency and sustainability and usually takes place in courses or trainings of shorter duration. • Intermediate qualification: This level provides more detailed and comprehensive knowledge and skills and often includes longer courses or courses and, possibly, an internship. • Advanced qualification: At this level, participants acquire a higher level of professional knowledge and skills that enable them to take on leadership roles and lead complex projects and initiatives. As a rule, it includes studies in higher education institutions or postgraduate courses.
<p>Selection and accreditation of trainers and quality control</p>	<p>Criteria for selecting trainers:</p> <p>Professional experience and background: trainers should have extensive professional experience and background in the field of energy efficiency and sustainability, including architecture and/or building services or energy and environmental protection.</p> <p>Relevance: trainers should be up to date with the latest trends, technologies and regulations in the field of energy efficiency and sustainability. As part of the accreditation process, expert opinions are usually taken into account to establish the professional and pedagogical quality of trainers and their training programmes. Feedback and evaluations from participants and other stakeholders are collected and assessed to continuously improve and develop the training programmes.</p>
<p>Incentives and drivers</p>	<p>The government could encourage environmentally conscious and energy-efficient renovation of condominiums. Companies, individuals providing property management services, equipped with knowledge acquired through training, could apply for these grants. The conditionality of the grant would extend to the efficiency of the renovation to the highest category of a Green Certification scheme (e.g. LEED, BREAM, WELL). This would also increase the value of the apartments in the given building.</p>



Financing and administration	<p>The administrative and other tasks of the trainings may be undertaken by an existing educational institution or one of the relevant chambers. Alternatively, they can be managed by training organizations or consulting firms that specialize in building management and sustainability.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Funding can be provided by the government budget or through grants offered by international organizations. Additionally, companies or foundations may be willing to offer financial support. The training programme can also generate its own revenue, for example, through tuition fees.</p>
Planned certification and accreditation	<p>The process of accrediting training for building operators involves defining necessary criteria and standards. The educational institution develops the training programme and submits the application. External evaluation and audits then determine certification or accreditation. The process is accompanied by regular review/monitoring and maintenance to ensure that the training is of high quality and effective.</p>
Monitoring and indicator numbers	<p>Number of participants and number of trainings announced. Monitoring the participation rates provides an important criterion for determining how much this knowledge is in demand. Through participant feedback, training materials can be continuously improved. This indicator shows how well the learned knowledge has been put into practice to improve the sustainability of buildings.</p>

Promoting the digital construction industry (B.4)

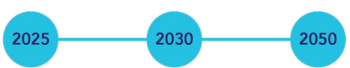

Description of the problem	<p>Construction professionals often have a lack of skills and qualifications in modern and emerging technologies, partly due to their age, past training and lack of individual motivation. An emphasized analogue approach to construction work processes, especially for smaller-scale projects, throughout the life cycle of buildings, missing out on the opportunities offered by digitalisation (e.g. thermal simulation, cost and data analysis, etc.), putting competitiveness, building quality (design, construction, renovation) and quality of life at risk. In addition, trainings and pilot projects presenting technologies are not widespread or are not an integral part of the current curriculum, thus hindering market uptake and everyday application.</p>
Objective	<p>In relation to the 9 main work fields²², drones, laser scanners, robots, robotics, automated and automatable processes (e.g. 3D printing), artificial intelligence, advanced software and intelligent applications should be effectively and purposefully used and cost-efficiently applied in engineering and vocational training, broken down into competence-based (knowledge and skills) learning outcomes.</p>
Description of the measure	<p>A comprehensive collection and organization of knowledge about digital tools, software, and platforms, categorized by specific fields, then translated into Hungarian. These materials should be integrated into formal educational programmes and made available in a modular format for dissemination and transfer to other training organizations and programmes.</p>
Expected result	<p>Development and domestic promotion of educational materials, e-learning materials and micromodules related to the digital construction industry supporting the digitalization of the construction industry are based on the results of international projects such as Construction Blueprint (Digitalization - training curricula).</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Coordinated use of central (education management) and corporate (education, further training) resources. Revenue: ensuring the availability of learning material (e.g. e-learning), hourly fee, exam fee.</p>
Monitoring and indicator numbers	<p>Number of accredited teachers and service providers, students participating in trainings, number of microcredits. Annual report, in particular on training supported by central or regional organisations.</p>

²² https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/RI/cwa17939_2022.pdf

Organising and supporting professional implementation excellence competitions at HuQF 3-5 (B.5.1)

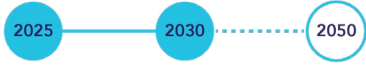

Description of the problem	Construction trades are not sufficiently attractive , so their prestige needs to be raised to encourage more students to choose professions within this sector.
Objective	The career guidance of students would be helped by enhancing the number of excellence competitions in professions belonging to the construction sector. Preparing for and conducting these competitions requires modern materials, which can be provided by manufacturing and distributing companies. The involvement of professional associations is necessary to attract these companies.
Description of the measure	Construction industry associations, with the support of manufacturing and distribution companies, should announce competitions of excellence in construction professions in addition to the Outstanding Vocational Student Competition (Professional Star Festival) and the National Vocational Study Competition.
Expected result	Professional associations of the construction industry, chambers of commerce, construction material manufacturers and distributors, vocational schools involved in construction training. Benefits: <ul style="list-style-type: none"> • Participants of the competition are expected to gain knowledge and practice the installation and use of modern building materials (technology). • Supports students' career orientation. • Competition significantly facilitates the professional development of students. • Competitions draw attention to construction trades and vocational schools.
Timeline 	Priority 
Resources and financial mechanisms	Resources needed to stimulate implementation For implementation the followings are required: <ul style="list-style-type: none"> • Organizational work by construction industry associations. • The provision of necessary materials by manufacturers and distributors of construction materials. • Providing competition venues and equipment for chambers and vocational training centres for the organisation of competitions. • Experts to compile competition tasks and evaluate competition products. Financial mechanisms: In addition to providing materials, financial resources are required to conduct competitions. This funding can come from a grants or contributions of supporters. Experts who compile competition tasks and evaluate competition products should be rewarded.
Monitoring and indicator numbers	The number of announced competitions, the number of participants in the competition. If the competitions are published on the website of a construction industry professional organization, it would allow for monitoring the quantity of competitions and maintaining a record of the number of participants in those competitions.

Organizing and supporting of competitions at HuQF 6-8 (B.5.2.)

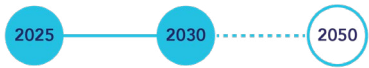

Description of the problem	<p>The increasing emigration of the workforce and the brain drain of young talents pose significant challenges for the country. The leaving of young professionals and talents, who play a valuable role in the economy and innovation, not only results in immediate professional losses, but also threatens economic and social development in the long term.</p>
Objective	<p>The objective of talent management focuses on two main aspects: 1) retaining existing talented young people in the country and 2) discovering and supporting new talents. These objectives collectively contribute to combating workforce emigration and the brain drain of young talents, while strengthening the country's economy and innovation.</p>
Description of the measure	<p>Organising and supporting theoretical competitions is a measure that can significantly contribute to retaining young talents and discovering new ones. Such competitions encourage broad scientific and professional creativity, promote the visibility of talents and the recognition of scientific excellence. The measure combines competition and cooperation, while supporting young people's development and commitment to professional careers. Examples of such competitions include Thesis competitions, Competitions supported by industry players and companies, Scientific Students' Association Conference, Doctoral School Excellence Competitions, International Competitions.</p>
Expected result	<p>The organisation and support of theoretical competitions is a wide-ranging measure of talent management affecting the educational, scientific and industrial sectors. The scope extends to universities, research institutes, companies, as well as regional, national and international levels. By organising and supporting competitions, the measure is targeted not only at university students, but also at the entire talented generation of young people.</p>
Timeline	Priority
	
Resources and financial mechanisms	<p>The financing and administration of scientific and theoretical competitions is a complex process, which includes budget formation, obtaining supporting funds, administrative tasks and keeping contact with participants. Resources may come from governmental support, grants, corporate sponsorships and scholarships.</p>
Monitoring and indicator numbers	<p>The participation rate in competitions should reach at least 50% annually in relevant training courses and sustainability-related topics. Indicator: the number of announced competitions and the number of participants in the competition.</p>

Introduction of interdisciplinary programmes and more flexible courses (B.6)



Description of the problem	<p>In construction training programmes, there is generally insufficient emphasis on renovation-related planning, execution and maintenance issues, as well as principles related to circularity and sustainability. Students in various disciplines within educational institutions often learn their professions independently, without experiencing how the construction or renovation of a building results from the coordinated efforts of multiple disciplines.</p>
Objective	<p>The aim is to introduce interdisciplinary programmes and more flexible courses on sustainability in engineering and vocational training programmes related to the construction industry. These programmes enable engineers to gain a more comprehensive understanding of sustainability challenges and solutions, as well as help them acquire a broader spectrum of knowledge in the field.</p>
Description of the measure	<ul style="list-style-type: none"> • Project-based learning: Project-based learning opportunities will be introduced, where students from different fields will become part of real projects and can learn the principles of circular design and sustainability related to renovation, as well as fostering interdisciplinary connections. • Professional connections and practical experience: Institutions actively seek partnership with professional organisations providing students with opportunities to gain practical experience, for example through participation in design and construction projects. • Centres for sustainable architecture and design: By establishing sustainable architecture and design centres or studios, institutions provide opportunities for students of related professions to learn environmentally friendly and sustainable practices. <p>Involvement of graduates, labour market expectations (see Construction Graduate Career Tracking System - Measure A.4).</p>
Expected result	<ul style="list-style-type: none"> • Project-based learning and hands-on experiences: Expanding project-based learning opportunities, collaborate with real projects, provide hands-on experience. • Building relationships: Building closer relationships with professional organisations, industry partners and the labour market. • Learning outcomes: Students will be able to apply the principles of circular economy and sustainability in their design, construction and maintenance decisions. They will possess skills in environmental assessment and conscious application of green design. They will also excel in professional communication and collaboration, facilitating effective teamwork with professionals and other disciplines. • Benefits: Establishing closer relationships with professional organizations and the industry enhances students' career prospects and access to practical experiences. The measures can promote environmentally friendly and sustainable design practices, contributing to the sustainable development of the construction sector. Through the introduction of interdisciplinary training units and flexible courses, students gain a wider range of knowledge, making them more adaptable to changing work environment.

<p>Timeline</p> 	<p>Priority</p> 
<p>Resources and financial mechanisms</p>	<p>Costs: development of new units and learning materials, including expert contracts and creation of teaching materials. Costs of involvement in training programmes, including invitations of experts, remuneration of external trainers and further training costs. Purchase and development of infrastructure and laboratory equipment for new courses and exercises. Costs of regular training, conferences and workshops for teachers and students.</p>
<p>Monitoring and indicator numbers</p>	<p>Indicators:</p> <ul style="list-style-type: none"> • Participation rates: The number and proportion of students applying to programmes and courses in a given semester or academic year. • Course completion rates: Track the number of students participating and the rate of successfully completed courses. This indicator indicates how seriously students take sustainability courses and are interested in them. <p>Monitoring: Tracking the development of students' professional skills and knowledge after completing courses. This may be, for example, a comparison of the results of exams between the initial and final levels of the course. As well as analysing feedback from industry players, companies and employers on the skills and knowledge acquired by students. This will help you assess how relevant and useful interdisciplinary courses on sustainability are for labour market expectations.</p>

Training of trainers at HuQF level 3-5 (B.7.1)

Description of the problem	The training of trainers (teachers), the lifelong learning and compulsory professional training of practitioners are not solved.
Objective	Compulsory and continuous training for teachers and institutionalisation of the proposed systems (e.g. recognition). It is necessary to expand the teacher training system to include sectoral training centres, dual training sites, and adult education instructors.
Description of the measure	Annual participation in mandatory training courses (e.g. conference, building visit) or organising professional consultations in collaboration with dual partners requires adequate financing. The mandatory training for educators should preferably be professional development. Entry requirements, qualification levels and certification of trainees: Full-time education and adult education providers can apply for further training for vocational trainers (HuQF4-8). The qualification of instructors includes completing mandatory continuing education every four years.
Expected result	In order for instructors in higher education and vocational training in the construction industry to possess up-to-date (both theoretical and practical) knowledge, there is a need for high-quality continuing education programmes. These programmes should cover topics such as energy efficiency, deep renovation, utilization of renewable energy technologies, etc. In vocational training, teachers are mandated to undergo 60 hours of further training every four years, but there are few specific professional programmes among the further training opportunities, such as the „Building automation skills“ advertised on the website of the IKK. (The programme includes 50 hours of intelligent building automation system knowledge.) „Credible“ vocational education requires well-trained instructors.
Timeline 	Priority 
Resources and financial mechanisms	The preparation of the train the trainer programme must be financed from grants or by the submitter of the continuing education programme. Currently the employer of the teacher covers the cost of their training. The planned introduction of an „Individual Learning Account“ could help in financing the training programmes. Due to the relatively high cost of professional instructor training, it is necessary for VET centres to receive budgetary resources for these further trainings.
Monitoring and indicator numbers	Number of participants in professional development courses for trainers. The IKK can provide data on the number of participants in training courses organized by IKK (via In-service Training System).

Training of trainers at HuQF level 6-7 (B.7.2)

Description of the problem	<p>There is no mandatory further training for teachers in the field of higher education. Obtaining a doctoral degree (PhD or DLA) is a requirement to maintain a teaching position and this entails a research obligation. However, this type of further education typically does not focus on planning or professional practice tasks. A significant number of instructors also work as practicing designers (e.g. architects, mechanical engineers) and continuous further training prescribed by the chamber is required for them to maintain planning rights.</p>
Objective	<p>Introduce compulsory continuing professional development training in higher education.</p>
Description of the measure	<p>Compulsory continuing training would include conference attendances and building visits, which would be accepted as accredited further training by the relevant chamber. This would enable educators to continuously update and expand their professional knowledge, thereby contributing to higher quality teaching and learning in higher education.</p>
Expected result	<p>In order for teachers in the construction industry field in higher education to possess up-to-date knowledge (theoretical and practical), there is a need for high-quality and continuous professional development. New knowledge and experience gained during continuing education can help educators update curricula and improve teaching methods. Lecturers can become acquainted with new research directions or projects, which can increase the efficiency and quality of university research and development activities. Upskilling programmes provide educators with opportunities to establish relationships and collaborations with other institutions, industry or professional organisations, which can facilitate knowledge transfer and innovation between universities and external actors.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Necessary financial resources could include government funding, scholarships, or participation fees, as well as potential support from corporate or civil organizations. State or sponsor funding may also be an option.</p>
Monitoring and indicator numbers	<p>Number of advertised courses, trainings, Number of participating instructors. Matching the numbers to the current chamber training system: 3 hours of training is 1 point, over 5 years 60 points - 12 hours per year. Thus, about 10,000 university lecturers - in the relevant field - should be provided with 12 hours per year (a total of 120,000 hours). The number and proportion of participants per year should be followed according to different categories (e.g. discipline, level of education, etc.).</p>



Non-marketing communication training (B.8)

Description of the problem	<p>The training of professionals takes place in a professional circle and the assessment of their knowledge takes place in front of a professional forum. Professionals often struggle to effectively communicate their arguments, goals and opportunities beyond their own professional circles to decision-makers, users and other fields of professions. The current approach to marketing communication primarily serves short-term economic interests rather than focusing on long-term objectives.</p> <p>Professionals are skilled in using technical language within their field, but they find it challenging to adapt their communication for non-professional audiences. Current communication practices typically assume that partners share a professional background and are not equipped to convey ideas that are accessible, persuasive, and engaging for those outside the profession. This approach overlooks the readiness and psychological perspectives of non-professional audiences.</p>
Objective	<p>The construction industry's extensive integration into our daily lives necessitates that professionals comprehend and align their work's goals and outcomes with the understanding of non-professionals, especially concerning long-term objectives like achieving carbon neutrality.</p>
Description of the measure	<p>The primary and nearly exclusive objective of education today, both theoretical and practical, is the acquisition of professional knowledge. The proposed measure aims to enhance theoretical and practical skills in communicating with non-professionals, optimize knowledge transfer methods, and integrate these communication skills into school based and adult education. Ideally, this practice should occur not only during the acquisition of theoretical knowledge but also at the practical skill level in daily activities, with results integrated into vocational training evaluation processes.</p>
Expected result	<p>The proposed measure aims to develop skills across all sectors and levels of the construction industry (HuQF levels 3-8), recognizing the varying content and depth related to professional knowledge. These training programmes are recommended to be developed within the frameworks of both blue-collar and white-collar professions, encompassing adult education as well as formal educational systems.</p> <p>As a result of this learning, skilled workers can achieve more successful collaboration with practitioners from related fields, while higher education actors can better engage with governmental, regulatory, and user stakeholders to achieve their objectives more effectively than current practices allow.</p>
Costs and benefits	<p>The costs of implementing the measure vary between two groups. In adult education (continuing education for professionals), participants are expected to cover the costs of courses, ideally taken over by their employers. In formal education, the implementation of the measure at educational institutions (vocational training schools and higher education institutions) does not incur additional costs or require additional resources. Developing such skills among professionals enhances the outcome of their work by ensuring that the value created is consciously utilized by informed users.</p>
Traineeships	<p>The introduction of Non-Marketing Communication (NMC) skills into vocational training and higher education occurs within the framework of the curriculum, no special internship period is required.</p>

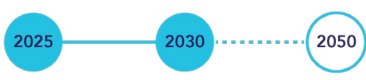

Multidisciplinary skills and knowledge	<p>NMC is an important component that encompasses a wide-ranging knowledge base significantly different from the specific field. This knowledge includes understanding the global implications of future requirements through communication with the intended audience and the methods of information transmission.</p>
Entry requirements, qualification levels and certification of trainees	<p>The development of NMC skills occurs either following or within education or professional training, without separate entry requirements, and the acquired knowledge is assessed during the final examination.</p>
Selection and accreditation of trainers and quality control	<p>The main challenge in implementing the proposed measure is determining who will create and be able to deliver this training. Establishing a growing number of training experts can be achieved through continuous professional development for professionals.</p>
Incentives and drivers	<p>To implement the measure, it is necessary to expand and motivate trainers by providing incentives. This includes professional recognition of their activities and financial incentives, both of which contribute to enhancing effectiveness.</p>
National registers	<p>The development of such skills is a fundamental requirement; thus a national registry is not necessary, but it is advisable to develop a registration system for trainers.</p>
Financing and administration	<p>The funding for the proposed measure involves developing interdisciplinary content, training and motivating instructors and launching the training sessions. The development of content and instructional methods by 8 experts is estimated to require a total of 100 workdays, including the preparation and publication of the study materials. These costs can only be covered from central funds. Following this, for the initial course with 30 participants over 60 hours, estimated costs would be 40 million HUF, covering organization, venue, instructor fees, course materials and scholarships, if applicable. After the initial course, the training can continue on a commercial basis in adult education and within the school system without additional cost requirements.</p>
Institutionalisation of the proposed systems	<p>The institutionalization of NMC training is not necessary. The organisation of trainers and trainings can be effectively carried out by higher education institutions or professional organisation.</p>
Timeline 	Priority 

Resources and financial mechanisms	<p>Based on the proposed measure, the initial training for 30 participants over 60 hours serves as an experimental phase, with costs covered only from governmental sources. In the following years, the training can continue on a commercial basis, accommodating 180-200 participants annually depending on the number of trainers available. The developed curriculum, once introduced into higher education institutions, can remain unchanged.</p> <p>For adult continuing education, it is justified to seek recognition through a micro-certification.</p> <p>The proposed measure suggests that a professional organization capable of developing interdisciplinary content, without economic interests in any specific detail, is suitable for designing the training. The developed curriculum is solely aimed at achieving the intended goals. Such an organization may secure funds for implementation through government resources or grants.</p>
Accompanying measures	<p>The NMC is significant not only for professions directly related to carbon neutrality but also across all technical fields in general. Therefore, broad support for this initiative is crucial from both governmental and professional sectors, not only financially but also at the communication level.</p>
Planned certification and accreditation	<p>Accreditation of the proposed training is required if it is recognised by means of a micro-credential.</p>
Monitoring and indicator numbers	<p>The proposed measure can be evaluated based on the number of participants in the training. This metric is applicable not only in adult education but also in the context of introducing it into higher education and vocational education systems.</p> <p>Monitoring of the measure will be conducted through data collection by the initiating institution of the training. In addition to collected metrics, short reports prepared at the end of courses are suitable for continuously improving the training.</p> <p>The proposed measure enables broad communication within the field and enhances its effectiveness, thereby contributing not only to the technical requirements of achieving the 2030 decarbonization goals but also fostering the active involvement and collaboration of practitioners.</p>



Occasional professional development courses at HuQF level 3-8 (B.9)

Description of the problem	<p>Environmental awareness is not sufficiently embedded in the daily activities of teachers, students and practitioners at all levels of society. A serious commitment grounded in substantial professional knowledge and scientific rigor is necessary, utilizing every opportunity available, including various forms of professional development programs.</p>
Objective	<p>A more effective coordination of organizations that facilitates the organization, coordination, and support of events aimed at knowledge and experience sharing.</p>
Description of the measure	<p>Scope: The scope of occasional professional development courses covers practitioners at all levels in all disciplines</p> <p>Content: Establishment of a coordinating organization. Organization and support of occasional professional training courses includes:</p> <ul style="list-style-type: none"> • Interdisciplinary meetings. • National professional visits. • Participation in international professional trainings. <p>Learning outcomes: Participation in occasional professional development courses familiarises practitioners:</p> <ul style="list-style-type: none"> • With the latest achievements in the field. • With the latest achievements in related fields. • The results of best practices. • International achievements and best practices.
Expected result	<p>In order for teachers in the construction industry to have up-to-date theoretical and practical knowledge in higher education, there is a need for high-quality continuing education programmes. These programmes should cover topics such as energy efficiency, deep renovation, utilization of renewable energy technologies, and other relevant subjects.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>These include the expenses for setting up the coordinating organization, as well as the participation costs for meetings, professional visits, and training sessions.</p> <p>State grant funding source, corporate capital.</p>
Monitoring and indicator numbers	<p>Establishment of the coordinating organisation in 2024. System operational from 2025.</p>

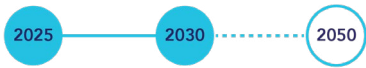

C. HUMAN RESOURCES MEASURES

Awareness-raising (C.1)	
Description of the problem	Environmental awareness has increased significantly recently, but further efforts are needed to achieve the 2030 and 2050 targets , which requires cooperation between educational institutions, professional organisations and businesses in developing and implementing awareness-raising programmes and initiatives (e.g. conferences, trainings, awareness-raising campaigns and communication programmes). Environmental education must be started with kindergarten and primary school campaigns and extended to residential, public and private building owners.
Objective	Coordination of conferences, trainings, awareness-raising campaigns and communication programmes aimed at raising environmental awareness. This includes the application of appropriate methods and techniques such as gamification, short podcasts on successful deep renovations and energy efficiency upgrades. Establishing a coordinating body responsible for the organized planning and support of these events.
Description of the measure	The coordination of various, currently fragmented and uncoordinated trainings, conferences, etc. by establishing a common coordinating body. This organization will collect, record, and share information related to trainings, conferences, programmes, campaigns, etc., among stakeholders.
Expected result	Scope: The scope of the coordinating organisation covers practitioners at all levels of all disciplines, educational institutions, the general public and owners of public and private buildings. Content: Establishing a coordinating organization. Elaboration of ways and means of awareness-raising. Learning outcomes: Awareness-raising programmes and initiatives, e.g. conferences, trainings, awareness-raising campaigns, gamification, communication programmes, sensitizing the non-professional population to environmental awareness.
Timeline	Priority
	
Resources and financial mechanisms	National grant, corporate capital
Monitoring and indicator numbers	Coordination can be organised immediately, but building a complete system takes time and resources. The system, if funds can be available, could be put in place by the end of 2024.

Motivating further education and postgraduate courses (C.2)

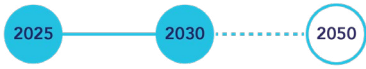

Description of the problem	<p>The achievement of carbon neutrality is a future goal that currently does not fall within the immediate interests and concerns of employers or employees. Both further education and postgraduate programs typically focus on current issues and training for long-term goals is only demanded by committed, forward-thinking individuals or organizations.</p>
Objective	<p>To find ways to create demand for knowledge in future skill needs in continuing and postgraduate education programs.</p>
Description of the measure	<p>The essence of the proposed measure is to achieve results through shared commitment from three parties. Employers benefit economically by having employees with timely skills, employees secure job opportunities with future-required skills and government involvement ensures a competitive economy contributing to national income growth. Accordingly, employers should provide paid time for training, employees should receive wage increases and the state should establish the necessary legislative framework for operating the system.</p>
Expected result	<p>Motivation should function at all levels of employees and across all professions, with particular emphasis on shortage professions. In the interest of achieving carbon neutrality, training content should focus on energy efficiency technologies and knowledge related to renewable energy sources that are not covered in formal education. This training should be tailored to the level and specific field of expertise of the professionals involved.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>The training costs should be covered by the employer, and the benefits also accrue to them.</p>
Monitoring and indicator numbers	<p>Number of postgraduate courses launched. Number of participants.</p>

Measures to promote women's participation (C.3)



Description of the problem	<p>One way to overcome labour shortages in the construction sector is to involve women. There is no significant issue regarding women's empowerment in design and other office roles, for example, they are already overrepresented among architects and architectural engineers. However, the challenge lies in women's involvement in „field“ work on construction sites, as there are several obstacles to this. Some obstacles are objective, such as women's empowerment in areas that could be harmful to their health. However, there are quite a number of professions and fields where the proportion of female workforce can be increased safely.</p>
Objective	<p>Making construction industry professions more attractive by ensuring suitable conditions:</p> <ul style="list-style-type: none"> • Identifying trades and fields where women's participation can be increased without objective risks. • Assessing obstacles hindering women from entering on-site construction work. • Collaborating with associations and organizations supporting women's participation and developing proposals to overcome barriers.
Description of the measure	<p>1.) Compilation of proposed positions: Following a thorough analysis of the professional directory and construction industry roles, it is necessary to select positions where increasing female participation is recommended.</p> <ul style="list-style-type: none"> • By profession: In vocational training, this includes professions and sub-professions (e.g., architectural technician, painter, decorator, wallpaper hanger, electrician, facility energy technician, ornamental and heritage tinsmith, reconstruction and heritage painter, digital data-related roles). In higher education, this covers almost all construction-related programmes apart from architectural engineering. • Based on job titles (e.g. construction manager, health and safety officer, etc.) <p>2.) Assessing obstacles requires detailed work, including personal interviews. 3.) Some proposals for overcoming obstacles may be obvious, such as providing appropriate and separate facilities like restrooms and changing rooms, ensuring adequate meal options and offering part-time job opportunities. Others may require more complex development.</p>
Expected result	<p>The measure covers all areas, professions and areas of expertise and actors in the construction industry.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>National funds, European projects</p>
Monitoring and indicator numbers	<p>Annual review of the number of female workforces, feedback. Number of female students enrolled in education.</p>

Promoting career guidance for young people at HuQF 1-6 (C.4)



Description of the problem	<p>There are not enough applicants for professions in the construction industry that would be able to replace retiring professionals. However, beyond replacement needs, there is a requirement for additional skilled workers to meet the expected increase in renovation projects.</p>
Objective	<p>To promote career orientation among young people before they make career choices, the number of students applying for professions in construction-related sectors (construction, building services, electronics, and electrical engineering) should increase.</p>
Description of the measure	<p>To solve the problem of low interest in construction careers among young people, especially since schools do not support missing classes for career events, we should improve existing opportunities instead of creating new ones. Therefore, it is better to make existing opportunities more effective by:</p> <ul style="list-style-type: none"> • Providing further training for career advisors in primary schools, keeping them informed about changes in vocational training and higher education. • Uploading short but informative videos describing various professions alongside their descriptions on the career orientation interface of IKK. These videos would support the work of school career advisors and vocational schools in guiding students. The videos would be directly accessible to students and their parents on the IKK platform before making career choices. <p>Focusing on level 6 vocational training (HuQF6), promoting certified technician training is recommended, as achieving a technician certificate with a minimum grade of four provides direct entry to higher education institutions. The Ministry of Culture and Innovation must authorize technician training programmes, requiring collaboration agreements between vocational schools and higher education institutions.</p> <p>Additional measures proposed include:</p> <ul style="list-style-type: none"> • Increasing sector attractiveness: Organizing visits to public sector projects, open days at businesses and targeted marketing campaigns to enhance sector appeal (C.6 measure). • Modelling and presenting career paths in the construction industry, reaching out to relevant stakeholders (A.7 measure). • Campaigns illustrating career opportunities for adults in the construction industry. • Implementing concepts similar to “cooking shows” but tailored to the construction industry. • Sector-specific competitions for adults working in the industry (B.6 measure). <p>The organization of training for career advisors should be delegated to professional organizations and vocational training centres at the county level. If the government does not undertake comprehensive video presentations of professions, professional organizations should secure funding, at least for producing profession-specific videos related to the construction industry (involving centres of education). In this case, films could involve vocational students, allowing them to explain why they chose construction-related professions and recommend them to others.</p>

Expected result	<p>The measure concerns:</p> <ul style="list-style-type: none"> • Primary school career managers. • Professional organisations in the construction sector. • Vocational education and training centres. • Higher education institutions. • Ministry responsible for vocational and higher education and ministry responsible for the construction industry. • Innovative Training Support Center Plc.
Timeline 	Priority 
Resources and financial mechanisms	<p>There is no cost to the „beneficiaries“ of the measures (career managers, pupils, parents). Videos must be freely available. Further training for career managers must be undertaken by VET centres (free of charge). The elaboration and possible accreditation of the further training program could be carried out with the involvement of experts of professional associations and organizations.</p> <p>For the implementation of the costliest part of the measure (making a video about professions), it is worth looking for funding from the EU.</p>
Monitoring and indicator numbers	<p>Number of career guidance managers who participated in further training, number of completed films showcasing various professions, number of certified technician training programs.</p> <p>If the further training is conducted by vocational training centres, data can be obtained from them. The number of completed films can be counted after they are uploaded.</p>



Demographic overview of workers in fossil fuel industry, assessment of skills and planning their integration into the construction industry (C.5)

Description of the problem	<p>The European Green Deal and the REPowerEU initiatives predict a future decrease of workforce employed in fossil fuel-related industries. This presents an opportunity to redirect this potentially available labour force to the construction industry, helping to address its labour shortages. The Mátra Power Plant, which primarily uses lignite (and to a lesser extent natural gas), employs around 2,000 workers and provides jobs to about 10,000 people through its suppliers. According to the website of the Hungarian Oil and Gas Company (MOL Group), they employ 25,000 workers. The MOL Miners' Union has several thousand members and according to the Hungarian Central Statistical Office 6,300 people currently work as miners although this number also includes stone and gravel mining.</p>
Objective	<p>Demographic overview of workers in fossil-related industries, assessment of their competencies and planning their integration into the construction industry. This should be done in a way that minimizes the need for extensive government funding for large-scale reskilling programmes.</p>
Description of the measure	<p>Setting up a working group with MVM-MOL-NEFMI-IKK to conduct a demographic overview of industrial workers, followed by competency-based skill assessments for the selected group of professionals relevant for retraining and vocational education. The information revealed by these assessments should be processed by an analytical team led by NEFMI and IKK. They should develop career-oriented vocational and retraining plans in collaboration with construction companies to meet labour market demands.</p>
Expected result	<p>Representing a significant labour capacity, workers in the fossil-related industry have a factor in considering future capacities. If the green transition progresses significantly in Europe and Hungary, reskilling and integrating workers in the fossil industry may become a reality and a necessity.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Public and private source</p>
Monitoring and indicator numbers	<ul style="list-style-type: none"> • Establishment of MVM-MOL-NEFMI-IKK working group - 2025, working group demographic survey - 2026, working group competence-based survey - 2026 • Development of a plan for NEFMI-IKK career models, retraining and vocational training - 2026 • Retraining and training launches - number of people retrained • Integration to the construction labour market - number of people employed



Involvement of construction companies in career guidance tasks (C.6)

Description of the problem	Construction companies are not sufficiently involved in career guidance activities.
Objective	Greater involvement of construction companies in career guidance tasks , enabling students to get a real picture of construction professions and working conditions.
Description of the measure	Construction companies need to be integrated into the coordination system for information promoting environmental awareness and involved in as many career orientation events as possible.
Expected result	<p>Scope: This measure targets the broader construction industry, including investment, planning, construction and regulatory tasks, involving a wide range of companies.</p> <p>Contents: Development of a system to increase the participation of construction companies in career orientation tasks. This involves providing incentives (detailed below) and handling organizational and coordination tasks.</p> <p>Learning outcomes: Students gain a real picture of construction professions and working conditions, enabling them to make informed career choices.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Resources needed to stimulate implementation: The beneficiaries of these measures such as career advisors, students and parents should not incur any costs for accessing these services. The videos should be freely accessible for viewing. Vocational training centres should cover the costs associated with the continuing education of career advisors. The development and accreditation of training programmes could be carried out with the involvement of experts from professional associations and organizations. EU funds, state funds, corporate capital can be used.</p> <p>Financial mechanisms: For the costliest measure, which involves creating video films to showcase different professions, it is advisable to seek funding from EU grants.</p>
Monitoring and indicator numbers	<p>Indicators: Number of career guidance managers who participated in further training; number of completed films showcasing various professions; number of certified technician training programmes.</p> <p>Definition of follow-up activities: If the further training is conducted by vocational training centres, data can be obtained from them. The number of completed films can be counted after they are uploaded.</p>

D. ECONOMIC AND FINANCIAL MEASURES

Financing adult education and training (D.1)	
Description of the problem	Underfinanced and low-prestige vocational and higher education.
Objective	The state should ensure the coverage of training costs for vocational schools and higher education institutions. As outlined in the Act on Vocational Education and Training, state-supported acquisition of two professions and one vocational qualification, as well as 10-12 semesters of supported studies at higher education institutions is available for individuals.
Description of the measure	The challenge is to address funding issues, focusing not only on teacher salaries but also on continuously improving the technical conditions of vocational training. This includes ensuring ICT (Information and Communication Technology) tools, software, digital learning materials and training resources are up-to-date. As the demand for adult education and training is expected to increase significantly in the future, it is crucial to secure adequate budgetary support.
Expected result	The training programmes are financed by the state on a normative basis. Companies participating in dual education can offset their costs as tax deductions (currently 13% of the wages as social contribution tax). Graduates of adult education and training will ensure that there are enough professionals for the construction industry to meet the building renovation plans undertaken by 2030. Construction professionals often return to education to acquire another profession (typically, e.g. bricklayer, tiler, insulator or structural builder and installer). This trend will only be increased by the fact that the training of professions starts with sectoral basic training, thus giving the opportunity to shorten the training time required to acquire a profession belonging to another sector.
Timeline	Priority
	
Resources and financial mechanisms	The state offers two professions and one vocational qualification free of charge at vocational training centres. Individuals can opt for a „Training Loan“ for self-financed adult education. State-supported training costs are disbursed to VET centres by the maintainer. Individuals interested in self-financed training can apply for a „Training Loan“ through the electronic interface once the training has commenced, provided they meet the specified conditions.
Monitoring and indicator numbers	Number of participants in adult education and training. The National Office for Vocational Education and Training and Adult Learning (NSZFH) Licensing and Examination Administration Department can provide data on adult education graduates. The NSZFH Department of Vocational and Adult Education (Adult Education Registration Division) is responsible for adult training.

International Mobility Programme for teachers and trainers (D.2)

Description of the problem	<p>Higher education institutions face a fundamental issue with the lack of mobility and international collaborations among teachers and educators.</p>
Objective	<p>Launch of an organised and supported International Mobility Programme for teachers and trainers.</p>
Description of the measure	<p>Development of mobility funds: Creation of a dedicated fund to provide financial support for teachers and trainers to engage in international mobility. This fund could cover expenses such as cost reimbursements, travel grants, and other resources that facilitate their stay abroad.</p> <p>Eligibility criteria: Define criteria for participation, including the duration of stay, the purpose of travel, and selection criteria for participants.</p> <p>Professional development programmes: Develop and compile programmes that promote international experience for participants, such as conferences, masterclasses, and other professional events.</p> <p>International institutional partnerships: Actively engage in building and strengthening relationships with other higher education institutions across Europe and worldwide. Support teachers in visiting these institutions to foster collaboration with other educators and professionals.</p> <p>Virtual mobility opportunities: The programme provides opportunities for virtual mobility, especially during periods when in-person travel is limited. Provide technological infrastructure and platforms for remote collaboration enabling participants to attend events and collaborate online.</p>
Expected result	<p>The programmes provide an opportunity for the institution to build relationships with other higher education institutions worldwide. This can facilitate collaborations in joint research projects, scientific events and other areas. Gaining international experience and collaborating with other institutions can generate new ideas and innovations for the institution. This can help develop teaching and research activities and contribute to increasing the competitiveness of the institution.</p>
Timeline 	Priority 
Resources and financial mechanisms	<p>Government and/or institutional scholarship programmes, travel grants, conference participation support, or workplace mobility assistance. Sponsorship from business and industry partners.</p>
Monitoring and indicator numbers	<p>Number of teachers participating in the programmes. Number of publications published in case of conference participations.</p>

6

ACTION PLAN AND MONITORING

6.1 Action plan for implementing the specified measures

The proposed measures aim to develop skills and competences, but their implementation will vary greatly in method and timing due to the specific circumstances of those involved. This project primarily focused on identifying gaps in skills and competencies within the construction sector. It comprehensively uncovered these gaps and made suggestions for addressing them. However, it directly undertook only the task of establishing connections among those involved in the implementation (endorsing organizations). The members of the **National Platform** are organizations for whom skill and competence development must be a key task for the future. However, they must also meet many other requirements in their work. Therefore, the National Platform members often, understandably, have to prioritize current tasks over the goal of developing skills and competences needed to achieve carbon neutrality in the construction industry. This influences the development of a realistic action plan. Generally, only those measures that specifically focus on skill and competence development can be planned and monitored effectively. Therefore, the action plan and monitoring processes are contingent on the nature of each measure and the participants involved in its implementation, necessitating an individualized approach.

6.1.1 Timeline (at least until 2030)

In planning the timeline for the project's measures, a key consideration was that the short timeframe available for skill development makes non-formal education the most viable solution. This option fundamentally encompasses two main areas:

- Adult education.
- Other non-formal (continuing) training.

In both areas, implementation will take more than a year. These types of education include both private and government-supported private training, offering a much faster and more flexible solution compared to formal education. In the case of **micro-certificates**, the launch of trainings follows the same schedule, but accreditation processes must be conducted simultaneously with content development. The introduction of micro-credentials is a **determined intention of the Hungarian authority responsible for education and training**. The establishment of system and its operation is currently underway. The national micro-credentials system must align with the international framework and achieving mutual recognition is also expected.

However, it is important to emphasize that for other skill and competence development measures, which are typically implemented over a longer period - such as changes affecting various levels of the formal education system - the execution of these measures should begin as soon as possible. Nevertheless, the specific timeline for these measures was not determined in this study.

A table has been compiled that links the key content and quantitative data on skill and competence development to each recommended measure. This provides an overview of the tasks and stakeholders involved in the Roadmap and the National Platform. The table aims to present:

- specific field or sector of activity,
- timing,
- qualification level of building professionals (HuQF 1-5 or 6-8),
- professional content or focus of the development,
- stakeholders to initiate and carry on the implementation,
- number of people affected in the country.

All areas of expertise in the construction industry have been taken into account, but due to their large number, detailed representation in a summary table is partly not possible and on the other hand not relevant. It is not relevant because the missing knowledge is mostly not profession-specific, but rather related to overarching concepts of carbon neutrality, which will be integrated into daily practices according to each specific profession. Therefore, in the table, we used broader sector labels such as construction (architecture), building engineering or building electricians.

The training number is the number of people who can realistically be enrolled each year, in accordance with the appropriate conditions from the educational side. The compilation of the proposed measures according to the listed aspects can be seen below (Table 7). The details of the information included in the table can be identified by the numbering provided.

Legend for Table 7:

<p>Financing:</p> <p>SF State Funding</p> <p>G Grant</p> <p>OR Own Resources</p> <p>EU European Union funding</p> <p>PO Professional Organizations</p> <p>F Fee-based</p> <p>CS Corporate Support</p>	<p>Indicators:</p> <p>RS Requirements System</p> <p>P Number of Participants, graduates</p> <p>L Legislation</p> <p>D Database</p> <p>OP Online Platform</p> <p>CM Career Model</p> <p>WV Website Visitors</p> <p>C Curriculum</p> <p>MC Number of Micro-Certificates</p> <p>COM Competition</p> <p>FS Number of Female Students</p> <p>PUB Number of Publications</p>
--	---

Table 7: Scope of proposed measures

Number of the measure	Measures	Level of training		Technical content		Initiator of implementation		Financing	Indicators	Life cycle stage						Implementation time				
		HuQF 1-5	HuQF 6-8	Energy efficiency	Renewable energy	Innovation	Professional organization			Training institution	Government	Building materials manuf.	Design	Construction	Usage	Renovation	Demolition, recycling	2025	2030	2050
A. Policy and strategic measures																				
A.1	Development of the Hungarian Construction Industry Sustainable Requirements System	x	x	x	x	x	x	-	-	SF, G	RS	x	x	x	x	x	x	x	x	
A.2	Stabilisation of the legislative environment	x	x	-	-	-	-	-	x	SF	P, L			x				x	x	
A.3	Defining compulsory qualifications	x	x	-	x	x	x	x	-	SF, PO	L	x	x	x	x	x	x	x	x	
A.4	Graduate Career Tracking System for the construction sector	-	-	-	-	-	-	-	-	PO, F	D, OP		x			x		x	x	
A.5	Review of the entitlement system	x	-	-	x	x	x	x		SF, EU	L	x		x		x	x	x	x	
A.6	Inventory of the built environment	x	-	x	x	x	x	x	x	SF, EU	D, OP			x	x	x		x	x	
A.7	Development of construction careers	x	x	-	x	x	x	x	-	SF, EU, F	CM	x	x	x	x	x	x	x	x	
A.8	Complex registration system in the construction industry	x	x	-	x	x	x	x	x	SF, EU, F	OP	x	x	x	x	x	x	x	x	
A.9	Skills and competence development website	-	-	-	-	-	-	-	-	SF	OP, WV	x	x	x	x	x	x	x		
B. Measures for training programmes																				
Quantity and quality of expertise at all levels																				
B.1	Revision of the curriculum (training and learning outcome requirements) at all levels																			
B.1.1	Revision of the curriculum at HuQF level 3-5	x		x	x	x			x	SF, OR	C	x		x		x	x	x		

Number of the measure	Measures	Level of training		Technical content				Initiator of implementation		Financing	Indicators	Life cycle stage						Implementation time		
		HuQF 1-5	HuQF 6-8	Energy efficiency	Renewable energy	Innovation	Professional organization	Training institution	Government			Building materials manuf.	Design	Construction	Usage	Renovation	Demolition, recycling	2025	2030	2050
B.1.2	Revision of the curriculum at HuQF level 6-7		x	x	x	x		x		SF, OR	C	(x)	x	x	x	x	(x)	x		
B.2	Development of (further) training programmes for sustainability in the construction sector at all levels																			
B.2.1	Development of (further) training programs at HuQF level 3-5	x		x	x	x	x	x		PO, OR, F, CS	MC, P	x		x		x	x	x		
B.2.2	Development of (further) training programs at HuQF level 6-7		x	x	x	x	x	x		PO, OR, F, CS	MC, P	(x)	x	x	x	x	(x)	x		
B.3	Training of building operators and the public	x	x	x	x	x	x	x		SF, OR, F	MC, P				x	x		x	x	x
B.4	Promoting the digital construction industry	x	x			x	x		x	SF, F, CS	MC, P	x	x	x		x	x	x	x	
Introducing innovative elements into training																				
B.5	Organising and supporting competitions at all levels																			
B.5.1.	Organising and supporting professional implementation excellence competitions at HuQF level 3-5	x			x	x	x	x	x	OR, G, CS	COM P			x	x	x	x	x	x	x
B.5.2	Organising and supporting of competitions at HuQF level 6-7		x	x	x	x	x	x		OR, G, CS	COM P	x	x	x	x	x	x	x	x	x
B.6	Introduction of interdisciplinary programs and more flexible courses		x	x	x	x		x		SF, OR, G	P		x	x		x		x	x	
Lifelong Learning																				
B.7	Training of trainers																			
B.7.1	Training of trainers at HuQF level 3-5	x		x	x	x	x	x	x	SF, OR, PO	P	x		x		x	x	x	x	

Number of the measure	Measures	Level of training		Technical content			Initiator of implementation			Financing	Indicators	Life cycle stage						Implementation time		
		HuQF 1-5	HuQF 6-8	Energy efficiency	Renewable energy	Innovation	Professional organization	Training institution	Government			Building materials manuf.	Design	Construction	Usage	Renovation	Demolition, recycling	2025	2030	2050
B.7.2	Training of trainers at HuQF level 6-7		x	x	x	x	x	x	x	SF, OR, PO	P	(x)	x	x	x	x	(x)	x	x	
B.8	Non-marketing communication training	x	x	x	x	x	x			SF, F	P	x	x	x	x	x	x	x	x	x
B.9	Occasional professional development courses HuQF level 3-8	x	x	x	x	x	x	-	-	SF, G, CS	P	x	x	x	x	x	x	x	x	
C. Human resources measures																				
C.1	Awareness-raising	x	x	x	x	x	-	x	-	SF, CS	P	x	x	x	x	x	x	x	x	
C.2	Motivating further education and postgraduate courses	-	-	-	-	-	-	-	-	CS	MC, P	x	x	x	x	x	x	x	x	
C.3	Measures to promote women's participation	x	x	x	x	x	-	x	-	SF, G, EU	FS	x	x	x	x	x	x	x	x	
C.4	Promoting career guidance for young people at HuQF level 1-6	x		x				x	x	SF, EU, CS	P	x	x	x	x	x	x	x	x	
C.5	Demographic overview of workers in fossil fuel industry, assessment of skills and planning their integration into the construction industry	x	x	x	x	-	-	-	x	SF, EU, CS	P	x		x			x	x	x	
C.6	Involvement of construction companies in career guidance tasks	x	x	x	x	x	x	-	-	SF, EU, CS	P	x	x	x	x	x	x	x	x	
D. Economic and financial measures																				
D.1	Financing adult education and training	x	x	x	x	x		x	x	SF	P	x	x	x	x	x	x	x	x	
D.2	International Mobility Programme for teachers and trainers	x	x	x	x	x		x	x	SF, EU, CS	P	x	x	x	x	x	x	x	x	

6.1.2 Resources needed to encourage training implementation

Encouraging the implementation of proposed skill development measures can be effective in two main areas:

- Within the organization initiating and conducting the measures.
- Among the participants involved in the skill development (learners).

The key players in implementing the proposed measures are training institutions and professional organizations. Their operations and tasks are defined by legal frameworks; therefore they do not need direct encouragement. However, **it is crucial that the legislation reflects the need to meet the climate neutrality goals outlined in the strategies.** These organizations can only fulfil their roles if they have adequate financial resources. Therefore, the focus should be on providing operational funding rather than incentives. Initially, this funding may need to come from government or investors, but eventually, the system should become self-sustaining and economically viable. This requires a sufficient number of participants and significant interest in the training programmes. To ensure this, training grants and scholarships are recommended. These can be claimed by both the individuals participating in the training and the businesses employing them.

The actors of the implementation of the measures are vocational training institutions, universities, professional and social organisations. The time required for their contributions is summarised in Table 8. The time needed to start the training programs is expected to be split, with about one-quarter for administrative tasks and the remaining three-quarters for work done by highly skilled workforce.

Table 8: Timetable and expenditure of proposed micro-certification measures

Tasks	Deadline	Necessary resources (working days)
Identification of relevant scientific fields and key players	15/07/2024	8
Selection and inviting of trainers	10/08/2024	80
Elaboration of the syllabus	10/08/2024	
Development of the curriculum	01/11/2024	200
Accreditation of training programme and curriculum	01/12/2024	400
Development of training methodology and preparation of electronic training materials	15/12/2024	
Announcement of training programme in adult education	20/01/2025	60
Running the adult education course	01/02/2025-30/12/2025	
Gathering the experience of the course and finalizing it based on the necessary adjustments	30/05/2025	12
Continuous announcement of new courses	01/09/2025	
The micro certification process implementation	continuously	10

For measures not directly initiating or conducting training, timelines and costs are often less predictable and typically fall within the general responsibilities of organizations (governmental, regulatory) to be performed.

6.1.3 Financial mechanisms

The established system of training courses meeting current market needs is in place and organizations (chambers, higher education institutions, professional organizations) sustainably exist on a market basis. However, if a training programme is developed that does not directly satisfy current market needs, it may not be advertised or financially feasible due to insufficient number of applicants. Therefore, organizations must secure funding through contracts or grants to develop essential training programme for the future. Additionally, sufficient incentives must be provided for participants to attend these trainings. This encouragement is crucial from both the participant's and the employer's perspective, as without either, the training cannot take place.

6.1.4 Accompanying measures

Beyond ensuring the financial conditions for training, the motivation of participants must also be supported through additional measures. This support is essential to make the training sustainable on a market basis and not just functional as long as central funds are available. Such supportive measures include proper communication and the recognition of participants' knowledge. For instance, this goal is facilitated by certifications, qualifications or other documentation received at the end of the training, such as micro-certificate, which can be used for further knowledge building.

6.1.5 Planned certification and accreditation

If the necessary skills and qualifications can be clearly defined in terms of specific knowledge, then these skills can be considered as partial professional or sector-specific qualifications. Such training should be recognized and managed by the state. To achieve the construction economy's goal of carbon neutrality, it is advisable to develop such training in several areas and several recommendations have been made for this in the Roadmap (Table 9).

Table 9: Subfields of skills development with micro-certification

	Topics for recommended micro-certificates
A	Sustainability: sustainability, energy efficiency knowledge and good practice related to the construction industry
B	Circular economy: Life-cycle design, construction and operation from a circular economy perspective
C	Smart solutions: learning about the principles and good practices of smart devices, smart cities and communities
D	Nature-based building materials, recycling: nature-based solutions and learning about the possibilities of recycling building materials
E	Getting to know the principles and good practices of deep renovation
F	Renovation of historical listed buildings: getting to know its principles and good practices
G	Digitalization: knowledge of robotics, drone technology, 3D printing and mechanization, ensuring a more favourable and safer work environment

The proposed measures ensure to supplement and upskill the knowledge previously acquired in a particular field, thus making it an active participant in the implementation of the tasks undertaken by the construction industry.

In addition to micro-certifications, it is essential to continue utilizing accredited training programmes and specialized postgraduate courses (such as professional engineering programs) in higher education. These forms of training can coexist alongside each other and complement each other effectively.

6.1.6 Quantifying adult education supporting skills acquisition

Based on expert estimates, the ConstructSkills4LIFE project consortium proposes recommendations regarding the **number of instructional hours for training programmes planned within the adult education system at vocational and higher education levels.**

Hungarian Qualification Framework levels 3-5

For blue-collar workers, specifically those with vocational training at levels HuQF 3-5, the duration of further training is set uniformly at 50 hours and courses leading to micro-certifications are estimated to have an average participation of 15 people. Table 10 shows the preferred training hours per sector based on the number of participants in various sectors.

Table 10: Elaboration of the necessary further training programmes according to proposed measures at HuQF level 3-5

Topics	Course duration (number of hours)	Number of participants	Number of participants in training, by sector, HuQF 3-5 (person)				Training duration (number of hours of courses)				
			Architecture	Mechanical eng.	Electrical eng.	TOTAL	Architecture	Mechanical eng.	Electrical eng.	TOTAL	
A	Sustainability	50	15	4 000	3 000	2 000	9 000	13 350	10 000	6 650	30 000
B	Circular economy	50	15	6 000	5 000	4 000	15 000	20 000	16 650	13 350	50 000
C	Smart solutions	50	15	3 000	4 000	3 000	10 000	10 000	13 350	10 000	33 350
D	Nature-based building materials, recycling	50	15	6 000	3 000	2 000	11 000	20 000	10 000	6 650	36 650
E	Deep renovation	50	15	6 000	5 000	4 000	15 000	20 000	16 650	13 500	50 150
F	Renovation of listed buildings	50	15	4 000	3 000	2 000	9 000	13 350	10 000	6 650	30 000
G	Digitalization	50	15	3 000	3 000	4 000	10 000	10 000	10 000	13 350	33 350

For example, in the case of the adult education programme B. Circular economy principles and good practices, calculated with courses of 15 people:

- Construction (architecture) sector: 6,000 people, 400 courses x 50 hours = 20,000 training hours
- Building engineering sector: 5,000 people, approx. 333 courses x 50 hours = 16,650 training hours
- Building electrical (electronics and electrical engineering) sector: 4,000 people, approx. 265 courses x 50 hours = 13,350 training hours

Hungarian Qualification Framework levels 6-8

For white-collar workforce, specifically professionals with higher education qualifications at levels HuQF 6-8, the duration of further training depends on the depth of its professional content. Courses leading to micro-certifications are estimated to have an average participation of 15 people. The training hours per sector are shown in Table 11 below. Participant estimates are based on active members of the Chamber of Hungarian Architects and the Hungarian Chamber of Engineers.

Table 11: Elaboration of the necessary further training programmes according to proposed measures at HuQF level 6-8

Topics	Course duration (number of hours)	Number of participants	Number of participants in training, HuQF 6-8 per sector (person)				Training time (number of hours of courses)			
			Architecture (architect + structural engineering)	Mechanical eng.	Electrical eng.	TOTAL	Architecture	Mechanical eng.	Electrical eng.	TOTAL
A Sustainability	20	15	8 750	1 600	1 500	11 850	11 667	2 133	2 000	15 800
B Circular economy	10	15	8 750	1 600	1 500	11 850	5 833	1 067	1 000	7 900
C Smart solutions	15	15	8 750	1 600	1 500	11 850	8 750	1 600	1 500	11 850
D Nature-based building materials, recycling	10	15	8 750	1 600	1 500	11 850	5 833	1 067	1 000	7 900
E Deep renovation	25	15	8 750	1 600	1 500	11 850	14 583	2 667	2 500	19 750
F Renovation of listed buildings	25	15	8 750	1 600	1 500	11 850	14 583	2 667	2 500	19 750
G Digitalization	15	15	8 750	1 600	1 500	11 850	8 750	1 600	1 500	11 850

For example, in the case of the adult education programme B. Circular economy principles and good practices, calculated with courses of 15 people:

- Construction (architect + structural engineering) sector:
8,750 people, 5,833 courses x 10 hours = 5,833 training hours
- Building engineering sector: 1,600 people, 107 courses x 10 hours = 1,067 training hours
- Building electrical sector: 1,500 people, 100 courses x 10 hours = 1,000 training hours

6.1.7 Structural measures to monitor skills needs in the construction sector

The completed Roadmap outlines the skills and competency development proposals for the construction economy taking into account present time and foreseeable future. However, due to the constant changes in circumstances, skill requirements cannot be treated statically and this must be considered when designing the system. In some respects, Hungary is in a favourable position because in its open economy, skill demands emerge even before they become a direct issue for the domestic economy. However, this requires that domestic professional and scientific actors maintain international connections and that there is a system in place to incorporate and utilize the experiences gained from these connections domestically. Measures have also been proposed in this regard (Table 12).

Table 12: Measures promoting sustainability and international relations

Measure No	The proposed action
D.2	International Mobility Programme: Higher education institutions should encourage teacher and trainer mobility and international cooperation to exchange experiences and best practices.
B.7	Training of trainers: Participation in compulsory further training every year (e.g. conference, building visit) or announcement of professional consultations in cooperation with dual partners
B.9	Occasional professional trainings: Organizing interdisciplinary meetings, events, organizing domestic professional visits, organizing and supporting participation in international professional trainings
C.1	Awareness-raising: Cooperation between educational institutions, industry organisations and enterprises in the development and implementation of awareness raising programmes and initiatives (e.g. conferences, trainings, awareness-raising campaigns and communication programmes). Environmental education must be started with kindergarten and primary school campaigns and extended to residential, public and private building owners.
B.8	Non-marketing communication training: Professionals should be prepared to communicate with non-professionals already during the training.

6.2 Monitoring the progress of proposed measures

6.2.1 Definition of indicators

The timetable for progress on the proposed measures of the Roadmap is realistic and verifiable. By 2030, the most realistic and comprehensive achievements are expected in the development and execution of further training outside the school system. To verify this, the training courses developed, and the number of participants make it clear that the commitments have been fulfilled. The planned number of further training programmes shown in Table 13.

Table 13: Qualification needs in the construction industry: number of qualification courses (1 day = 8 hours) per HuQF level and relevant topic area (own estimation and compilation, based on relevant Hungarian Central Statistical Office data)

The number of further training courses about the relevant topics (1 day course/year)					
Relevant topics	professionals <u>HuQF</u> levels				
	1 - 2	3 - 4	5 - 6	7	8
nearly zero energy buildings		600	400	300	2
renewable energy sources	5 500	2 000	800	300	
deep renovation		4 000	1 200	600	4
refurbishment of heritage buildings			200	300	
circular building model		800	400	200	6
building information modelling (BIM)	4 000	1 000	800		
dynamic building simulation			200	50	1
smart devices and building		2 000	600		3
life cycle assessment		100	100	100	2
building classification systems		500	1 000	400	4
smart cities and communities				50	2
total	5 500	14 000	5 900	3 100	24

6.2.2 Definition of follow-up activities

The proposed measures of the new Roadmap and the commitments towards carbon neutrality in the domestic construction economy will be realized through the cooperation of institutions directly involved in training and government organizations within the framework of the National Platform. The platform's activities, relationships and outcomes can only achieve their goals with full public transparency. To this end, **we propose to create an internet website**, where monitoring activities can be made visible and necessary corrections can be continuously implemented based on this, ensuring the sustainability of the path towards achieving carbon neutrality.

7

CONCLUSIONS

The purpose of this document is to facilitate the provision of training needs required to ensure energy efficiency and minimize environmental impact throughout the entire life cycle of our built environment, in order to achieve the 2030 targets set by the European Union and national goals.

Improving the energy performance of buildings throughout their life cycle requires engineers and construction professionals who can proficiently apply sustainability principles and leverage evolving technologies. The skills and competences needed to ensure sustainability are not yet universally integrated into formal educational curricula. Therefore, it is necessary to supplement and complement these skills across all professions and levels. The proposed measures within the project aim to address how these skills can be attained across various fields. However, a significant number of these measures focus not only on content-related issues but also require interventions in policies and institutional frameworks. This stems from the fact that knowing something is not sufficient, it must also be effectively applied. The experiences in this area highlight several challenges that need to be addressed and underscore the direct influence of skills development in this regard.

The implementation of the renewed Roadmap and its Action Plan **are basically influenced by two main factors:**

- The measures affect areas with significant inertia and slow response times, such as public administration and education. Therefore, during the period leading up to 2030, these measures may not be fully implemented or may only be partially successful.
- The effectiveness of the measures depends on the professional deepening of the social embeddedness of the construction industry. The process of shaping societal awareness is long-term and only initial steps can be taken in this regard. Furthermore, the efficiency of these steps heavily depends on other economic and political factors (such as inflation, wars, etc.).

In this project, the proposed measures to achieve the 2030 targets were developed based on the evaluation of the measures from the BUSH project and the professional aspects identified in the Status Quo Analysis of the currently implemented ConstructSkills4LIFE project²³. The nearly decade-long gap between these two documents highlights the current state of implementing these measures. This comparison reveals that the realization of the proposed measures depends on numerous factors that go beyond immediate rational considerations and include broader influences such as prevailing interests, emotions and the general state of the world. These are obstacles that cannot be ignored, even if we understand that our ability to influence them is uncertain.

Within the framework of the project, we can only expect results from solving the necessary skills gaps to

²³ Status Quo Analysis on the training of construction professionals – skills needed to achieve the 2030 building energy and climate targets. ConstructSkills4LIFE project. 2023.06

achieve the 2030 goals if we also take into account the broad connections and social embeddedness of the construction industry. Due to the limitations of scope, we could not cover them within the framework of the project, but the elaborated Roadmap **should be interpreted** with these limitations and findings.

Therefore, the Roadmap had to start from the current conditions but aimed to avoid specific forms of existing structures in favour of formulating a more content-focused and organizational development approach to achieve its goals.

When defining the proposed measures, we could not ignore what we currently consider feasible (between 2024 and 2030) nor the obstacles we face. We also examined what activities will remain after 2030 to achieve full carbon neutrality. It is important to remember that the **2030 goal is not the endpoint but a milestone** - setting an easier target for us by 2030 will make our task harder after 2030. This means that **time is our greatest challenge** and our goals themselves pose the biggest obstacles.

Certainly, alongside clear goals and intentions, we are aware of the practicality and risks associated with implementing the proposed measures of the National Roadmap. These risks arise from the consequences of stakeholders' actions and various external factors. These risks remain significant even with the establishment of a National Platform to support the roadmap, where the participants' commitment to implementing the measures is explicitly stated. These concerns do not arise primarily in the content of skills development or the training programmes themselves, but rather the economic and regulatory conditions surrounding them. The **expected outcomes of the measures, grouped by action areas, are the primary focus of these considerations:**

A, Policy and strategic measures:

- The regulatory framework will support and encourage the uptake of circular economy models and practices.
- A detailed review and restructuring of the higher education strategy, updating and expanding university courses in order to respond to new challenges and technologies, including new courses on climate change and sustainability issues through the review and analysis of university degree programmes.
- Progress will be made in developing more competitive training programmes focused on market needs, introducing and exploiting opportunities for Alumni, and enhancing industry collaborations, among other areas.
- In non-formal education and training, will implement a review of qualification systems and the relationship between qualifications and entitlements. This includes expanding mandatory qualifications (regulatory and/or statutory), developing the Construction Industry Career Model, establishing a new skills and entitlement tracking system, modernizing the Hungarian Standard Statistical Classification of Economic Activities (TEÁOR), and revising the Hungarian Standard Classification of Occupations (FEOR).

B, Measures for training programmes:

- **Quantity and quality of expertise:**
 - In the field of vocational training, the training of trainers, the development of dual training places, the development of Training and Output Requirements and Programme Requirements, the introduction of micro-certificates for energy efficiency trainings, participation in annual compulsory further training will become important.
 - New disciplines are emerging or are given greater emphasis in some of the previous ones, such as life-cycle-based, circular economy design, implementation, smart solutions, principles of smart cities and communities, nature-based building materials, nature-based solutions, people centric, resilience, health, and well-being principles, principles and methods of cooperation between professions.
- **Introduction of innovative elements in the training:**
 - Increasing the number of theoretical professional competitions, increasing the activity of participation in competitions of professional excellence, wider application of gamification and the creation of Open Innovation Test Bed systems.
 - Improving the flow of information in higher education, creating a more flexible and dynamic university structure.
- **Lifelong learning:**
 - In non-formal education and training, the relationship between entitlement systems and qualifications and entitlements will be reviewed, compulsory qualifications (of an official and/or official nature) will be extended, a career model of the construction industry will be developed, a new skills and entitlement tracking system will be established, the Hungarian Standard Statistical Classification of Economic Activities (TEÁOR) and the Hungarian Standard Classification of Occupations (FEOR) will be revised.

C, Human resources measures:

- Greater emphasis will be on awareness-raising, proper career guidance, talent management, involvement of women, retraining of workers in the fossil fuel energy sector.
- Company managers are motivated by continuous professional development.
- Raising awareness among actors in fields other than construction sector.

D, Economic and financial measures:

- The necessity of additional funding is accepted for developing new training materials and resources, improving education financing, supporting digitalization, and expanding wages in the construction economy.

- Providing adequate resources for continuing education, equipment upgrading, IT development and ensuring stability of the legal background of vocational training.

The wide-ranging impacts of the Roadmap’s proposed measures ensure the undertaken decarbonisation of our built environment. In the field of the built environment, the identified and necessary measures for skills development define tasks for a wide range of actors involved in its implementation. Addressing this task as part of the entire national economy requires more than just declaring intent; it **necessitates sustained organized cooperation. Institutionalizing this cooperation through a National Platform** would significantly facilitate stakeholders’ collaboration, but it requires measures that exceed the manageable tasks of the project. Within the framework of the project, we could only propose to initiate a measure so that the activities of the National Platform could be publicly monitored. This project can serve as a basis for this public visibility, a task the project consortium can undertake if there is intent and economic conditions allow.

ANNEX 1- ENDORSEMENT OF THE ROADMAP

The key measures of the project and the planned timetable for their implementation were developed in consultations with the relevant authorities and stakeholders. As members of the National Platform, these authorities agreed with the key measures and the timeline. The results of the project have been accepted and supported by the organizations listed in Table 14 and this support has been confirmed with official statements before the closure of the Roadmap document.

Table 14: Endorsing organisations

No.	Name of endorsing organisation	Type of organisation
1.	Ministry of Construction and Transport, Deputy State Secretary for the Construction Industry	Governmental/ Authority
2.	Ministry for National Economy, Deputy State Secretariat for Employment and Programmes	Governmental/ Authority
3.	Chamber of Commerce and Industry of Békés County	Chamber
4.	Chamber of Hungarian Architects	Chamber
5.	Hungarian Chamber of Engineers, Section of H.V.A.C	Chamber
6.	Archenerg cluster	Professional association
7.	National Federation of Hungarian Building Contractors	Professional association
8.	Hungarian Scientific Association for Buildings	Professional association
9.	Hungarian Building Materials and Building Products Federation	Professional association
10.	Hungarian Gas Industry Entrepreneurs' Association	Professional association
11.	Hungary Green Building Council	Professional association
12.	Hungarian District Heating Association	Professional association
13.	Tiles & Bricks Hungary	Professional association

14.	Budapest University of Technology and Economics, Department of Construction Materials and Technologies	Education/training
15.	Budapest University of Technology, Department of Building Service and Process Engineering	Education/training
16.	University of Pécs - Faculty of Engineering and Informatics	Education/training
17.	Széchenyi István University, Faculty of Architecture, Civil Engineering and Transport Sciences, Department of Architecture and Building Constructions	Education/training
18.	Budapest Complex Vocational Training Center	Education/training
19.	Technical Institute of the Hungarian University of Agriculture and Life Sciences	Education/training
20.	Gyula Center for Vocational Training	Education/training
21.	Hódmezővásárhely Center of Vocational Training	Education/training
22.	Aereco Légtechnika Ltd.	Construction company
23.	AIRVENT Légtechnikai Ltd.	Construction company
24.	DAIKIN Hungary Ltd.	Construction company
25.	ENSI Ltd.	Construction company
26.	Grundfos Hungary Ltd.	Construction company
27.	HERZ Armatúra Hungaria Ltd.	Construction company
28.	KÉSZ Group Plc.	Construction company
29.	Lekics Engineering Office	Construction company
30.	MERKAPT Ltd.	Construction company
31.	REHAU Ltd. Building Engineering Division	Construction company
32.	Rosenberg Hungária Lég- és Klimatechnikai Ltd.	Construction company
33.	Siemens Zrt. SI Building technology	Construction company
34.	Szívós Team Ltd.	Construction company
35.	Vaillant Saunier Duval Ltd.	Construction company
36.	Weishaupt Hőtechnikai Ltd.	Construction company
37.	ÉMI Non-profit Limited Liability Company for Quality Control and Innovation in Building	Project partner coordinator
38.	Geonardo Ltd.	Project partner
39.	Budapest University of Technology and Economics, Faculty of Architecture	Project partner Education/training
40.	Békéscsaba Center of Vocational Training	Project partner Education/training
41.	Hungarian Coordinating Association for Building Engineering	Project partner Professional assoc.

ANNEX 2- SWOT ANALYSIS SUMMARISING FINDINGS OF THE SQA

Useful (+)
to achieve the goal

Harmful (-)
to achieve the goal

INTERNAL FACTORS - characteristics of the organisation

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • The adoption of a „professional/ engineering“ mindset increasingly observed at small and medium-sized enterprises • BIM is becoming more widespread in business, vocational training and higher education • Certain employers show strong support for continuous learning and professional development • State support for training: two professions and one vocational qualification in vocational training centres and 12 semesters in higher education institutions (i.e. 1 MSc. degree), plus a scholarship scheme and a vocational training work contract • A significant number of university lecturers are practitioners and therefore also attend mandatory training courses organized by professional chambers • The development of digital learning materials - which do not cover a complete subject but smaller units (micromodules) - has started • International experience, training sharing, transfer, Build Up Skills experiences, good practice: high quality training plans, training materials and modules have been developed and are available in the context of EU projects (Trainbud, Newcom, BIMzeED, BUS-GoCircular, Train4sustain, IS-SusCon, etc.) • Measures in existing building energy strategies supporting higher education (e.g. National Smart Specialisation Strategy (s3), 2021-2027) • Professional engineering courses are of high quality and provide up-to-date knowledge 	<ul style="list-style-type: none"> • Qualification gaps (market, businesses) • Lack of motivation, disinterest and basic skills of students • Lack of Lifelong Learning: lack of training for trainers, lack of lifelong learning for practitioners, lack of mandatory continuing training • Inconsistent quality of theoretical and practical knowledge transfer in dual training system • Introduction of BSc in higher education led to a decline in quality • University systems are slower to respond to change, training areas are not aligned • Lack of literature and teaching materials • There is insufficient emphasis on design-construction-maintenance-circularity issues and knowledge related to renovation in both academic and vocational education • Lack of collaboration skills, teamwork • Large disparities in the conditions and equipment of practical training due to lack of funding

Useful (+)
to achieve the goal

Harmful (-)
to achieve the goal

EXTERNAL FACTORS - characteristics of the environment

OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • „Accredited” teachers/trainers, professional knowledge centres • Strengthening communication with construction companies • A good opportunity to organise and publicise various competitions and contests, generating more media coverage • Vocational school, university career guidance and job fair • Responsible involvement of dedicated professional associations in the operation of training/qualification systems • Introduction of modern didactic methods (blended learning, gamification, short videos) to better communicate with young people • Linking existing research teams • Dual training, a living environment to encourage professional collaboration • digitisation: free educational versions of programmes (like Archicad) 	<ul style="list-style-type: none"> • Lack of a structured postgraduate training and qualification system at construction level as well as a system to monitor and control it • Curricula are quickly outdated, not updated or updated late • Poorly funded, low-quality vocational and higher education • Low level of foreign language skills, no language exam required for the diploma • Concept (mis)interpretation: different interpretations of basic concepts (e.g. environmental awareness) • Risks of learning online (unedited material) • Government programmes: Frequent changes in the legislative framework (e.g. vocational training) • The role of the black economy is still very high in housing renovation • Skilled workers leave the company earlier if trained • Price is the customer’s priority, so building energy and other considerations are sidelined

AUTHORS AND CONTRIBUTORS

ÉMI Nonprofit Llc. for Quality Control and Innovation in Building:

- Zoltán Budavári
- Roland Fisi
- Dorottya Hujber
- Dr. Krisztina Ligetvári
- Dr. Károly Matolcsy
- András Pandula
- Balázs Tóth
- Dr. Klára Szita Dr. Tóth
- Krisztina Virókné Szilágyi

Budapest University of Technology and Economics:

- Dr. Gergely Dobszay
- Dr. Sára Hrabovszky-Horváth
- Dr. Perlakiné Dr Csilla Patkó
- Dr. Lajos Gábor Takács

Hungarian Coordinating Association for Building Engineering:

- Dr. István Barótfi
- Dr. Zoltán Magyar
- Attila Zoltán

Békéscsaba Center of Vocational Training:

- Edit Szabados
- Pál Vlcskó

Geonardo Ltd.:

- Péter Gyuris
- Dóra Leitner

Contributors, external reviewers, members of the external advisory board:

- Éva Beleznay
- Gábor Gyura
- Dr. Ferenc Makovényi
- Géza Matuz

GLOSSARY

AR/VR	Augmented Reality /Virtual reality
BA, BSc	Bachelor's degree (Bachelor of Arts, Bachelor of Sciences)
BIM	Building Information Modelling
BREEAM	Building Research Establishment Environmental Assessment Method
BUSH	BUILD UP Skills Hungary project
CPD	Continuing Professional Development
CO2	Carbon dioxide
DGNB	Deutsche Gesellschaft für Nachhaltiges Bauen
DPR	Graduate Career Tracking System (Diplomás Pályakövetési Rendszer)
ÉDPR	Construction Graduate Career Tracking System (Építőipari Diplomás Pályakövetési Rendszer)
EU	European Union
FAR	Adult Training Data System (Felnőttképzési Adatszolgáltatási Rendszer)
FEOR	Hungarian Standard Classification of Occupations (Foglalkozások Egységes Országos Rendszere)
GHG	Greenhouse gases
HCSO	Hungarian Central Statistical Office
HuQF	Hungarian Qualification Framework
IKK	Innovative Training Support Centre Plc.
KKK	Education Training and Learning Outcomes Qualification Requirements (Képzési és Kimeneti Követelmények)
LCA	Life Cycle Assessment
LEED	Leadership in Energy and Environmental Design
LTRS	Long-Term Renovation Strategy
MA, MSc	Master's degree (Master of Arts, Master of Sciences)
MKIK	Hungarian Chamber of Commerce and Industry
NECP	National Energy and Climate Plan
NMK	Non-marketing communication
NMP	National Mobility Programme
NSZFH	National Office of Vocational Education and Training and Adult Learning (Nemzeti Szakképzési és Felnőttképzési Hivatal)
nZEB	Nearly Zero Energy Building
OH	Educational Authority (Oktatási Hivatal)
Ph.D, DLA	Post doctoral degree
PK	Programme requirements (Programkövetelmény)
SMEs	Micro, small and medium enterprises
SQA	Status Quo Analysis
SWOT	Strength, Weaknesses, Opportunities, Threats
TEÁOR	Hungarian Standard Statistical Classification of Economic Activities (Tevékenységek Egységes Ágazati Osztályozási Rendszere)
WAM	With additional measures
WELL	WELL Building Institute building standard
WEM	With existing measures



**CONSTRUCT
SKILLS4LIFE**

