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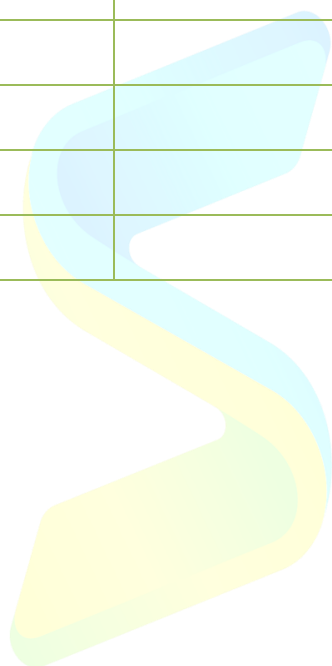
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Authors	Tomo Cerovsek
Contributors	Dejan Papic
Reviewers	Lihnida Stojanovska-Georgievska, QAM
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EETheSkills

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1. Introduction

The aim of the SEETheSkills project is to act at market level to stimulate the demand for previously developed and new or upgraded energy skills, and thus help enable energy efficient (EE) construction of new and renovation of existing building stock.

It builds on the foundations created as part of previous BUS experiences in the five partner countries – North Macedonia, Slovakia, Slovenia, Spain, and The Netherlands.

This project will first gather the best practices and ensuing lessons-learned in order to level-up the achievements from national level to interregional level.

It will act through a novel 3V approach to tackle direct simulation of demand of energy skills. The 3V stands for Visibility, Validation, and Value.

Visibility of skills will be enabled through the creation of an on-line repository, which will make skills visible, accessible and available on an interregional level.

The skills will be Validated by being comparable across partner countries and by transferring and replicating training schemes between project partners.

The previous two steps will raise the Value of energy skills and thus the market demand, by expressing their benefit in achieving sustainability of construction.

Work Package 2 (WP2) is dedicated to conducting the Interregional survey, through which we will identify current Status Quo on existing EE measures. The output of the WP2 will “feed” the databases in WP6, with the collected information.

The task “Task 2.1 Exploring current status of energy skills on EU level”, as part of the WP2, is aimed at conducting desk research through which we wanted to identify information pertaining the existing position of energy skills in construction business on the EU level, with a special focus on the five partner countries.

Through the task we looked at things, such as the initiatives affecting the status of demand of energy skills, level of awareness, current offer of training schemes, available certifications, legal obligations, predictions of further development, and others.

The output of the task is “2.1.1 Desk research on state-of-art of energy skills on EU level”.

The methodology for the research is described in chapter “2. Methodology”. The majority of the research was conducted at the University of Ljubljana, with the partners contributing at key points of the research, with their specialist and locational knowledge.

Chapter 3 focuses on presenting the main results of the desk research. All identified information can be found at the end of this document, in Appendixes.

In chapter 4 we discuss the results.



2. Methodology

The methodology undertaken as a part of work package 2 (WP2) on the SEETheSkills project to identify inputs for the later work packages consists of continuously progressive filtering of data through five main stages with iterations at each stage to the previous one.

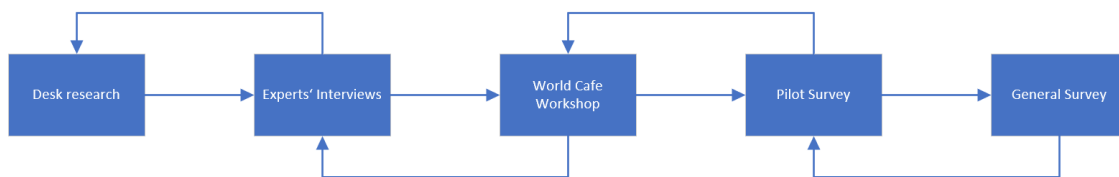


Figure 1 Methodology for the WP2 research

The five stages were:

- Desk research

The goal of the Desk research stage will be to get a comprehensive overview of the information created in the area of Energy Efficiency (EE) and Renewable Energy Systems (RES), going both wide, by trying to identify as many different examples as possible, and deep, by digging into the examples themselves.

The key areas the research will focus on are:

- Skills defined in national roadmaps
- Skills developed as part of previous BUS projects
- The developed training schemes
- The number of trained workers and professionals
- Companies who design and produce EE materials
- Status of Recognition of Previous Learning (RPL)
- Status of demand for energy skills
- Level of awareness of energy skills
- Available certifications
- Legal obligations promoting use of energy skills and their timelines
- Predictions for future development of energy skills
- Experts' interviews



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The goal of the Experts' Interview stage will be to validate the information sources acquired in the Desk research stage and to enhance the collection through the addition of information sources by the experts for their respective countries.

The first step is to ask the experts to review the central registry of information sources, located within the Zotero database, and conveniently accessible through a desktop application and a web browser. Their task was to add information sources and tag as "Not relevant" sources which they felt were not relevant for whatever reason.

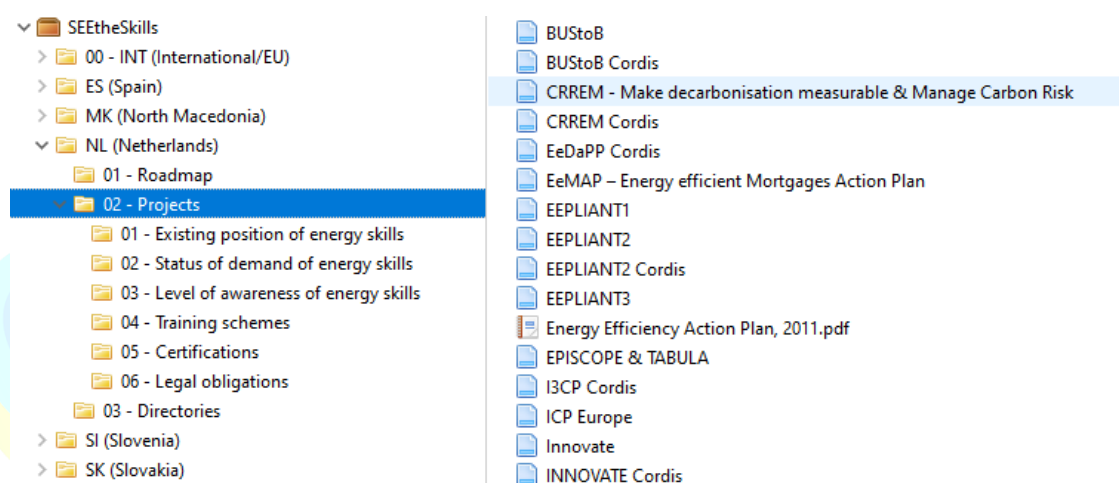


Figure 2 Zotero desktop application's interface

Second step is to conduct one-on-one interviews with the experts. These can take the format of 1-1, or 1-many, in cases where we have multiple partners from single country.

The data collected as part of the interviews will serve us to filter the information sources collected as part of the Desk research stage.

- World café Workshop

The goal of the World café workshop is to integrate the thinking of partners from each country, through mixed team discussions.

The experts will be divided into X number of groups, consisting of three to four members, with each member of the group from a different country. Each of the groups will be led by a facilitator, whose task will be to lead the discussion and involve all group members.

There will be two rounds of discussions:

- First workshop - Title: How can we identify through the survey which initiatives had the most positive effect on the construction industry professionals and why?



- Second workshop - Title: How can we identify as many (both quantitative and qualitative) industry professionals and encourage them to participate in the survey?

After each of the rounds, each of the groups will nominate a member to present their discussions. At that point, all other workshop participants will be asked to comment on and discuss points raised.

After the workshop we will filter the data further and pinpoint the questions for the survey.

- Pilot Survey

The goal of the Pilot survey stage will be to test the assumptions and the chosen questions on a dataset of industry professionals from Slovenia.

- General Survey

The general survey will be implemented across all project countries. First, a translation of the questionnaires will be done and then the most appropriate channels for dissemination of the survey will be identified and used. This survey will provide a valuable results that will further serve as a guideline toward the future project activities, mainly in the scope of the necessary training schemes, for which an existing gap will be identified.

3. Results from desk research

3.1. Desk research

Through our desk research we collected over 500 sources of information for all partner countries on the key topics, as defined within the methodology, from which we extracted information related to our work.

The most interesting examples are presented in the next parts. The whole list of information sources can be found at the end of the document.

3.2. Skills defined in national roadmaps

Roadmaps for the need of development of construction sector, realize din BUS pillar 1 (listed in the annex) are, with some exceptions, focused on professionals carrying out the work on-site, i.e., blue collar workers, however in North Macedonia, they have also identified the need for Architectural design, and thus professions connected to that. In subsequent waves of projects, others have also expanded the profiles to white-collar workers.



While many of the professions in need of upskilling have been identified in all countries, there are others which are country specific. The reasons for this may be numerous, from work profiles which cover different areas, to different context, such as climate, which needs different professional profiles. Some countries acknowledged that all professions need some level of upskilling on the topic of EE and RES.

The professions and skills identified through the Roadmap documents can be found:

- North Macedonia
 - o Roadmap pages 32-36
- Slovakia
 - o Roadmap is in Slovakian language
- Slovenia
 - o Roadmap pages 36-48
- Spain
 - o Roadmap pages 42-43
- The Netherlands
 - o Roadmap pages 73-78

3.3. Skills developed as part of previous BUS projects

The skills defined in the national roadmaps have been developed through various national and international projects under the umbrella of BUS and Horizon 2020. These were enhanced with later defined skills for digitalisation and expanded to include higher education professions. In most of these cases, digitalisation is incorporated under the heading of BIM. The occupations for which skills have been developed can be found in the tables below. Slovenia didn't have BUS projects after the initial one where they defined the Roadmap and so doesn't feature here.

In parallel, many other projects have been taking place as a part of Interreg and Erasmus, and other initiatives, many of which were also focusing on various aspects of green skills. Often, these enriched the spectrum of skills available, and directly impacted the drive of professionals in the built environment industry, to acquire EE and RES skills. These projects were often working on the bigger picture initiatives, such as on the level of municipalities, to increase their drive towards sustainability targets, services, financing, etc. The information about these can be found under the Training schemes heading.

Whilst the BUS and Horizon2020 projects often publish the competencies developed as part of the projects, some of the other projects do not. Hence it is hard to identify what kind of knowledge, skills and competencies are needed to successfully perform tasks related to EE and RES.



Similar challenge is with local languages, as a majority of the content has been published in national languages.

Many of the information sources for older projects are not accessible anymore. In some cases, the work done within the projects is no longer valid, or may have been picked up by another project and taken a step further. However, sometimes, the information created is still valid, but the access to it has been corrupted (wrong or broken links, websites not working, etc.), which is a challenge.

Table 1: Skills developed in Slovakia as part of previous BUS projects

StavEdu (http://www.stavedu.sk/Zameranie-StavEdu.html)	ingREeS (http://www.ingrees.eu/en/services/training-programmes/)	CraftEdu (https://database.craftedu.eu/cs)
Gross production	Architects and planners	Carpenters
P SV	Civil Engineer - site manager	Window installers
Installation of prefabricated components and structures	Construction site supervisor	Waterproofers
Roof waterproofing	Assessors of the Achieved EE of the buildings	Electrician for intelligent wiring
Finishing work	Sustainability/Energy advisor	Electrician for heavy current
Installation of heating and cooling systems		
Construction machinery		
Energy systems and equipment		
Lighting systems		



Table 2: Skills developed in North Macedonia as part of previous BUS projects

BEET & TRAINEE (https://ks.org.mk/en/our-work/activity-module-training/)
Installer of electrical installations with skills for implementation of energy efficiency measures
Installer of systems for heat, ventilation and air conditioning, with skills for implementation of energy efficiency measures
Graduated architectural engineer with skills for implementation of energy efficiency measures in design
Certified Designer of solar-thermal systems in buildings
Certified Installer of solar-thermal systems in buildings
Certified Designer of photovoltaic systems in buildings
Certified Installer of photovoltaic systems in buildings
BIM for practitioners: engineers, architects and technicians
BIM for decision makers, market, owners
BIM for builders and contractors
BIM for industry and manufacturers
Facade worker with skills for implementation of energy efficiency measures
Roof construction worker with skills for implementation of energy efficiency measures
Carpenter Installer with skills for implementation of energy efficiency measures

Table 3: Skills developed in Spain as part of previous BUS projects

Construye2020 (http://construye2020.eu/en/plataforma-sobre-formacion-profesional/recursos-de-formacion)
Thermal insulation
Biomass facilities
Geothermal facilities
Window installation
Profitability in EE of buildings
RES in buildings
EE in buildings
Air conditioning installation



Table 4: Skills developed in the Netherlands as part of previous BUS projects (Translated with Google Translate)

BUSstoB (https://buildupskillsnederland.nl/english/)
Soil insulation
Communication in construction
Sustainable building materials
Energy-neutral building envelope
Facade insulation with paneling
Facade insulation with masonry
Facade insulation with brick slips
Facade insulation with plaster layer
High-quality insulated glass
Information processing construction
INSITER Ultrasound and ultrasound training
Flat roof insulation
Airtight building
Assembly of frames, windows and doors
Assembly of prefab roofs
Mounting prefab dormer windows
Assembly prefab facade element concrete
Assembly of prefab facade elements - wood
Assembly of prefab floor elements
Mounting pivot windows
Installation of vegetation on roof and facade
Pitched roof insulation (under tiles)
Post-insulation ground-floor
Post-insulation roof - inside
Post-insulation pitched roof
Post-insulation PUR
Post-insulation cavity walls
Post-insulation floor with foil
Post-insulation retention wall
Renovation of wooden floors
Collaboration in construction
Switchable glass / smart glass
Sun resistant window film



3.4. The developed training schemes

Through the many projects and private organisations, a multitude of training schemes, programmes, courses, and modules have been developed, to cover all topics and enable efficient upgrade of skills.

The training schemes range from country specific, such as TRAINEE in North Macedonia or Construye2020 in Spain, to international, such as EUREM, and BREEAM.

Topics range from EE specific, such as the ones by Construction blueprint, to RES at the Adult Education Center in North Macedonia, to BIM, by Bouwend Nederland, wider digitalisation by European Heritage Academy, standards, such as the ones by CEN-CE project, energy labelling and testing (EEPLIANT), and others.

However, sorting between the information available online is often quite hard, and time consuming, which is not ideal for busy construction professionals. These professionals are also often not intellectual workers, which means they are not savvy in using complicated technologies available to them, to identify the right courses for them.

Remember – people don't know what they don't know, therefore they need an efficient mechanism to point them in the right direction and start them on their journey of lifelong learning. The question poses itself – what is the best way to bring the right training schemes to busy professionals?

To enable the professionals, a platform has been developed in the Netherlands, which houses 500 courses and can be accessible via a web browser or the BUS Advisor app. These are structured in such a way, so that each is connected to a generic set of EE and RES skills, and also to available certifications. Many are a part of wider learning paths.

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3.5. Status of Recognition of Previous Learning (RPL)

We live in an ever-changing World, where new megatrends, such as demographic trends, digitalisation, etc., disrupt different parts and even whole industries on a regular basis.

Along with those, our environment is changing, adapting to humans' influence on it.

Combining those changes with sudden, societal disasters, such as Covid or the Financial crisis, means we as a society need to adapt to new circumstances continuously.

In the chart below by Burning Glass, based on the research on changing job skills by Harvard economists, we can see how much certain jobs have changed since 2007, with Mechanical drafters leading at 40%, and Architectural and Civil drafters in third at 34%.



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Figure 3 Fastest changing professional occupations, https://www.burning-glass.com/skill_change/

The matrix below puts construction industry on the second to last spot on the industry digitalisation index. This suggests the potential to change and disrupt it is huge and, more or less, untapped. Professionals within it may need to adapt their competencies in the future even more.

The construction industry is among the least digitized.

McKinsey Global Institute industry digitization index; 2015 or latest available data

Relatively low digitization Relatively high digitization
 ● Digital leaders within relatively undigitized sectors



Figure 4 The level of digitalization of the industries, <https://www.mckinsey.com/business-functions/operations/our-insights/imagining-constructions-digital-future>

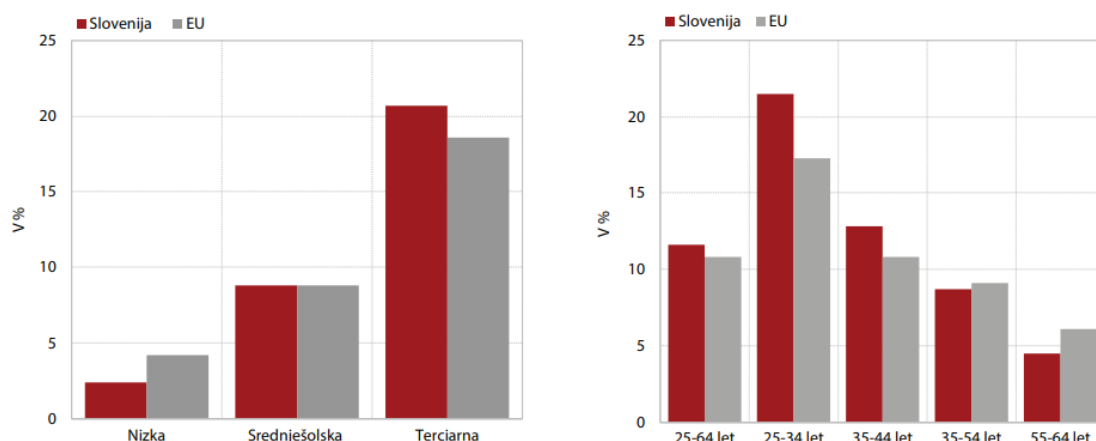


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Lifelong learning is here to stay, and in its Strategy of Development of Slovenia 2030 (SRS 2030), Slovenia has listed lifelong learning as one of its 5 strategic directions.

The goal Slovenia set for itself is to have 19% of its population aged between 25 and 64 involved in some kind of learning each year, from the year 2030 onwards.

In 2016 11,6% of adults (25-64) in Slovenia and 10,8% in the EU participated in lifelong learning. A breakdown based on education and age groups can be found in the graphs below.



Vir: Eurostat Portal Page – Education and training, 2018.

Figure 5 The share of life long learning in Slovenia and EU, https://www.umar.gov.si/fileadmin/user_upload/razvoj_slovenije/2018/slovenski_grafi/P2.pdf. Left: Number of adults participating in in lifelong learning, based on their education level (from left to right: primary school – high school – tertial), Right: Age groups participating in lifelong learning

From the graphs it is clear there are differences based on age and education level, in how likely an individual is to participate in lifelong learning. This begs the question how does each of the groups need to be approached to stimulate them the most.

However, the culture doesn't change overnight, and stimulating industry professionals from an industry, which has more or less been the same since the time they built the pyramids, to change, to adapt, and to learn new things, is hard.

Since the human's earliest days, migration from less suitable areas to more suitable areas has been a norm. Despite often negative portrayals of migrations, McKinsey (<https://www.mckinsey.com/featured-insights/employment-and-growth/global-migrations-impact-and-opportunity>) reports that whilst only 3,4% of the world's population are migrants, they contribute almost 10% to global GDP. Therefore, it seems these are highly driven, capable, and motivated individuals who contribute to local and global economies, and thus must be enabled to achieve their full potential.

In 2020 in the EU (https://ec.europa.eu/info/strategy/priorities-2019-2024/promoting-our-european-way-life/statistics-migration-europe_en), 8,6 million (4,6%) of all employed individuals were non-EU citizens, with construction being one of the main sectors which



benefits from them. 8,6% of non-EU citizens are employed in construction, compared to 6,4% of EU citizens. Looking more specifically at occupational groups, 5,8% of them are building workers (compared to 3,6% of EU citizens).

Free movement (<https://ec.europa.eu/social/main.jsp?catId=457>) between EU countries is one of the fundamental principles on which the EU is built. In the following table, based on the data [here](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_citizens_living_in_another_Member_State_-_statistical_overview) ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU citizens living in another Member State - statistical overview](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_citizens_living_in_another_Member_State_-_statistical_overview)), we can see the mobility of citizens of working age has risen between the years 2010 and 2020 in the partner countries (no data for NM):

Table 5: % of mobile citizens (aged 20-64) by country

	Slovakia	Slovenia	Spain	Netherlands
2010	2,8	1,9	0,7	2,5
2020	5,3	3,5	1,1	2,8

Percentage (<https://www.pewresearch.org/global/interactives/origins-destinations-of-european-union-migrants-within-the-eu/>) of EU citizens born outside but who live in the partner country (no data for NM) in 2015:

Slovakia	Slovenia	Spain	Netherlands
3%	3%	4%	3%

This study from 2019 (<https://www.indeed.com/lead/career-change>) by Indeed, the job searching engine, found that 49% of adults have made a dramatic career shift. 65% of the others are thinking about it. Therefore, people are less likely to stay in the same industry their whole lives. Be that due to losing their jobs, or just losing interest in their current jobs. This gives the construction industry an opportunity to attract new people from other industries.

In 2019, women represented only about 10% of employees in the construction industry. Out of those, 86,7% are in office positions. 2,5% of tradespeople are women (<https://www.bigrentz.com/blog/women-construction>). The numbers suggest, the construction industry is missing out on a big percentage of talent available to it.

To enable the construction industry to benefit the most, we need to find ways to stimulate professionals already in the industry to continue acquiring relevant skills, attract new talent to the industry by enabling them to gain required knowledge to make the switch successfully, and recognise the knowledge of people from other parts of the world.

Recognition of previous learning (RPL) is a process through which individual's skills and knowledge, acquired outside of formal learning frameworks, can be recognised against a given standard, competencies or learning outcomes.



Benefits of RPL to individuals, employers, and training providers

The International Labour Organization has published a document "Recognition of Prior Learning (RPL) Learning Package", which describes main building blocks of an RPL system, and describes a number of case studies and examples from different countries.

A European approach to micro-credentials

ISO Construct project was looking to provide low skilled or unskilled workers with an approach to certify their skills and competencies. The basis for the project was ISO 17024:2003 standard. This standard has since been upgraded to ISO 17024:2012.

A RPL methodology was developed through BEET and TRAINEE projects in North Macedonia and is being implemented through the North Macedonia Knowledge and Skills Management Centre. It follows the "Identification - Documentation – Assessment – Certification" framework, set out by the European Training Foundation (https://ks.org.mk/wp-content/uploads/2021/03/Methodology_for_RPL_TRAINEE_publication_final.pdf).

In 2007 Slovakian government adopted the Strategy of Lifelong Learning and Lifelong Guidance, which included RPL. It is intended to enable citizens to acquire new knowledge, skills and abilities in a flexible way, regardless of their current life situation. One of its outcomes was Act N° 568/2009 Coll. adopted in December 2009, on lifelong learning and on amendments to certain laws, which provided a number of important tools for further development of lifelong learning, such as accreditation based on qualification standards, recognition of achieved training outcomes, monitoring and forecasting of training needs.

In the Netherlands, the EVC provides a certificate for work experience and informal learning. Its goal is to facilitate job-to-job mobility of workers. They also have EVP, which is a simplified version of EVC. Knowledge, skills and experiences are recorded in a portfolio, but it doesn't constitute a certificate, and there is no assessment. Statistics show that in 2013, 17700 EVP procedures were completed. Evaluation of the EVC procedure concluded, that it is most effective when combined with career counselling and guidance.

3.6. The number of trained workers and professionals

The partner countries have identified within their Roadmap documents the approximate (min and max) number of professionals they needed to train by 2020 within each of the areas most impacted by EE and RES.

Identifying the actual numbers of trained professionals proved to be quite a challenge, as such numbers are not published very often by various training providers. We relied heavily on the national registers of various professions, but these are disparate systems, providing little insight, and on partners from the countries in question.

In North Macedonia, they have developed a centralised database of professionals and their certifications gained through the BUS and Horizon 2020 projects, therefore it is quite easy to

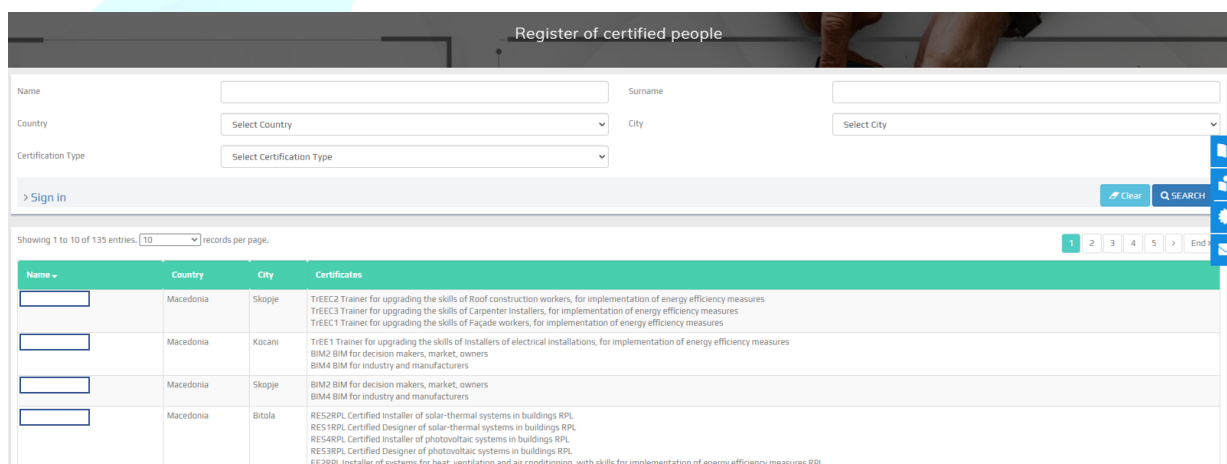


extract the numbers of certified professionals. It becomes a little harder when we need to identify and add numbers of trained professionals through other initiatives, be those EU funded projects or private organisations. We had great help from the North Macedonian project partners, who were able to provide the following numbers:

The number of trained and certified professionals through BEET and TRAINEE projects in North Macedonia is 1566. This includes trainers, instructors, and blue- and white-collar professionals, certified through in-classroom training or RPL, but does not include professionals trained through formal education channels.

The numbers from other projects are approximate, and they are about 225. These include professionals trained as a part of BIM cert project, USAID, Knauf, Rehau, and Adult Education Centre initiatives.

As part of the research, we have identified a number of repositories of professionals who have acquired energy skills. These can be found as part of “Status of demand for energy skills” chapter.



Name	Country	City	Certificates
	Macedonia	Skopje	TrEEC2 Trainer for upgrading the skills of Roof construction workers, for implementation of energy efficiency measures TrEEC3 Trainer for upgrading the skills of Carpenter installers, for implementation of energy efficiency measures TrEEC1 Trainer for upgrading the skills of Facade workers, for implementation of energy efficiency measures
	Macedonia	Kocani	TrEE1 Trainer for upgrading the skills of installers of electrical installations, for implementation of energy efficiency measures BIM2 BIM for decision makers, market, owners BIM4 BIM for industry and manufacturers
	Macedonia	Skopje	BIM2 BIM for decision makers, market, owners BIM4 BIM for industry and manufacturers
	Macedonia	Bitola	RES2RPL Certified installer of solar-thermal systems in buildings RPL RES1RPL Certified Designer of solar-thermal systems in buildings RPL RES4RPL Certified installer of photovoltaic systems in buildings RPL RES3RPL Certified Designer of photovoltaic systems in buildings RPL EE2RPL Installer of systems for heat, ventilation and air conditioning, with skills for implementation of energy efficiency measures RPL

Figure 6 North Macedonian centralized database of certified professionals

3.7. Companies for design and production of EE materials

As part of the research, we took a look at how rich is the market for EE and RES materials and equipment design and production. Companies who design and produce such materials are an important enabler and driver for adoption of EE skills and competencies.

This kind of companies respond to market demand for construction of new and refurbishment of existing buildings according to energy efficiency standards, by creating EE materials and equipment, and often going beyond that, by creating new and innovative products, which improve energy efficiency even further. In many ways, these companies push the boundaries



of our knowledge in the field. As such, they need to be involved in the process of education of professionals.

To be able to use and install their products in the right way, industry professionals need to be adequately trained and aware of the latest developments in the field. Companies who design and produce EE materials often have their own certification programmes, which they require industry professionals to complete to use their products. More on this in the subsequent chapters.

We found a number of companies producing different types of EE materials and equipment. Their products range from heating solutions (radiators, boilers, underfloor heating, circulation pumps, valves, etc.), solar energy solutions (PV & PVT collectors, water heaters), air conditioning (heat pumps, air conditioning, fans, chillers), coatings (water proofing, thermal protection, paints, sealants), foams, thermal insulation materials and systems, to whole (prefabricated) buildings.

The list of companies, along with their details, can be found in the Annex.

3.8. Status of demand for EE skills

Status of demand for EE skills is driven by a number of direct and indirect factors, some of them focused at individuals and others at companies.

It is the investment in the improvement of energy efficiency of the built environment which ultimately drives the need for companies who can actually perform such work and thus for the professionals who have/need the skills. A number of projects and other organisations have worked on mechanisms to support and increase the investment:

Financing is the most direct option here. In the Netherlands, they have a financing guide, which is periodically updated. A number of funds exist who offer financing of investment, such as the EBRD Green Economy Financing Facility in North Macedonia, Building Energy Efficiency Facilities (BEEFs) in Slovakia and Spain (ESBEEF), Eko Sklad in Slovenia.

To reduce reliance on grants and subsidies, EuroPACE project looks to develop an on-tax financing mechanism.

Energy Efficiency Mortgage Initiative helps grow multi-stakeholder energy efficient mortgage ecosystems, which aim to facilitate the transition to green mortgages.

There are other mechanisms which attract investment, such as certification of buildings. Project CEC5 has focused on the implementation of a common certification procedure for RES and EE public buildings in Slovenia and Slovakia. In Spain, the BES office certification certifies, that an office is sustainable, healthy and comfortable working space. Certification of projects is also offered, in some cases, to raise investor confidence, by certifying that they are investor ready – Investor Ready Energy Efficiency Certification by ICP, and the BREEAM-NL certificate.



ESI model serves as a mechanism to reduce the risk to investors in EE through financial and non-financial elements designed to work together.

A very important mechanism is the education of investors and creation of compelling offers for investors, which explain to them in an easy-to-understand way and applicable to their context (young families, empty nesters, etc.), the benefits and mechanisms available to them (Refurb project in Slovenia and the Netherlands).

For investors who are not sure whether energy efficient refurbishments are for them, easy to use calculators have been developed, showing the potential savings ("Porabi manj" calculator in Slovenia, Rental Cal tool in Spain and the Netherlands), and interactive maps, showing the energy efficiency potential of different regions (ENGIS in Slovenia).

Nothing hurts investors like losing money and CRREM project's tool will clearly communicate the financial risks associated with poor energy performance of the building stock (Spain, Netherlands).

Whilst it is the investors who often get the ball rolling, it is the professional organisations who actually answer their call. Therefore, it is paramount organisations with adequate capabilities exist, to deliver energy efficient projects and building stock. Mechanisms available to them are:

Organisations are encouraged to develop their capabilities in EE building and refurbishment through loans and grants, such as are offered through SME Competitiveness Support Programme in North Macedonia, and Emilie project happening in Slovenia and Spain, which focuses on growing innovation capacity in SMEs around the topic of EE.

Registers for companies who perform certain work, such as the KS register for companies performing energy audit in North Macedonia, and a register in Netherlands (Central Register Techniek), where you can search companies by their field of work, raise the demand for such companies, as they expose them to the potential investors, and thus raise the willingness or eagerness of such companies to acquire EE and RES capabilities.

The well-publicised "Diesel dupe" scandal sparked a number of projects, focused on the energy labelling of products and checking their compliance with legal requirements, such as the EEPLIANT 1, 2, and 3 projects in Slovenia, Spain, and the Netherlands.

There are a number of standards which relate to energy efficiency. These standardise requirements and, as they become widely adopted within organisations, drive the demand for energy skills:

ISO 50001:2018 Energy management systems – Requirements with guidance for use

ISO14001:2015 Environmental management systems

ISO 50002:2014 Energy audits

ISO 52000-1:2017 Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures



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At the end of the day, it is the industry professionals who actually deliver the EE work. The organisations hiring them should ensure they have the competencies they need to perform their work successfully, and the investors should have an easy-to-use way of checking their competencies. There are a number of mechanisms available to professionals, to acquire and expose their competencies:

A number of registers have been created for individuals, who have acquired EE skills and been certified, where they are publicly visible to everyone, from organisations hiring professionals with such skills, to investors looking to build EE buildings. In North Macedonia, they have created a national register of professionals with skills and certifications, acquired as part of the BUS initiative, in Slovenia there is the Enforce network of energy inspectors for buildings, which lists professionals by their region, the BREEAM ES register in Spain, and many others. In the Netherlands, a user-friendly search engine by Techniek Nederland can help investors find accredited professionals.

To make things even easier and more user friendly for clients, Central Register Techniek in the Netherlands allows them to identify a professionals' accreditation on site by scanning a QR code.

Other experts act as ambassadors for EE skills, promoting them to wider audiences, such as the EUREC Ambassadors register.

A need to re-skill people, who are not yet a part of the construction industry has been made apparent in the Roadmaps. This includes women, who are not very well represented in the industry, and which means the construction industry is losing half of the brightest people by default (BUS-to-B project in the Netherlands was looking at ways to challenge that status quo). Many people, who have been made redundant in other industries, can find a new home in the construction industry. And immigrants, who are in many cases very skilled, but don't have a formal way of proving their skill, must be enabled to join the ranks of industry professionals.

Being able to anticipate skills needs is extremely important as it helps prepare the training community's capacity. Construction blueprint has developed a big data-based methodology to anticipate skills needs at a national and regional level in Spain.



Figure 7 The EE circle of demand, centered around the successful delivery of energy efficient buildings

3.8. Level of awareness of EE skills

Level of awareness goes quite often hand in hand with the status of demand, as people are naturally curious, and want to improve. Therefore, understanding there is something “more” out there, being able to find what is needed, having it packaged in an intuitive manner, and then being able to apply it to achieve certain benefit, will help drive the demand for skills.

A standard approach to fostering the awareness of EE and RES related skills and other activities impacting skills, is a publication of latest developments within the projects, organisations and other such initiatives. Those may be in the form of newsletters, articles, blogs, social media posts, videos, and others, such as the UrbanLearningEU channel of YouTube. Such news is often also driven through on-site activities, such as conferences and other promotional events.

Partnerships between organisations help expand the audience to reach more industry professionals, such as the memorandum of recognition and collaboration KS has in North Macedonia with relevant market actors.

Going further are various learning catalogues, where people can get more detail about what and how they will learn, and how they will be able to apply it, such as the TRAINEE training catalogue, PROF-TRAC's table of competencies and skill recommendations, and BUS NL's competency books.

Assessments can be utilised effectively to point the trainee towards the gaps in their knowledge and help them to prioritise them. Tools, such as the one by the SKSI in Slovakia and SKILLgApp application are available. In the Netherlands an interesting tool has been developed, the Digital Skills Passport, which can be utilised to plan the next steps on your learning journey.



By connecting various collections of materials around a certain topic, best practice packages can be created, such as the TABULA webtool, for which they created National Building Typologies, and EPISCOPE's Energy Performance Indicators for Building Stocks, Good practices in rehabilitation and Technical documentation on Construye2020 website, and The Dutch Building Commissioning Association.

These can be improved even further by bringing together a group of experts to curate and expand it, creating methodologies, such as the "Metodologija izvedbe energetskega pregleda" and "Priročnik" in Slovenia (Energy inspection methodology, and Handbook), and bodies of knowledge.

A big driver of awareness are also ambassadors, who have tried it and feel so passionately about it, they decided to promote it.

This knowledge can be further expanded by adding context specific experiences by involving interested users to create forums, interest groups, and networks, such as PANEL2050, Energy Efficient Cities best practices, PVportal, ZDES consortium, Knowledge repository by C-Track50 project, TVVL, and others.

Whenever we try to improve something, we should also be able to check how successful we are. Therefore, we should be able to understand the level of awareness of industry professionals, their organisations, and the investors through surveys, and other such mechanisms. An article was published in North Macedonia, titled "An empirical survey on the awareness of construction developers about green buildings in Macedonia".

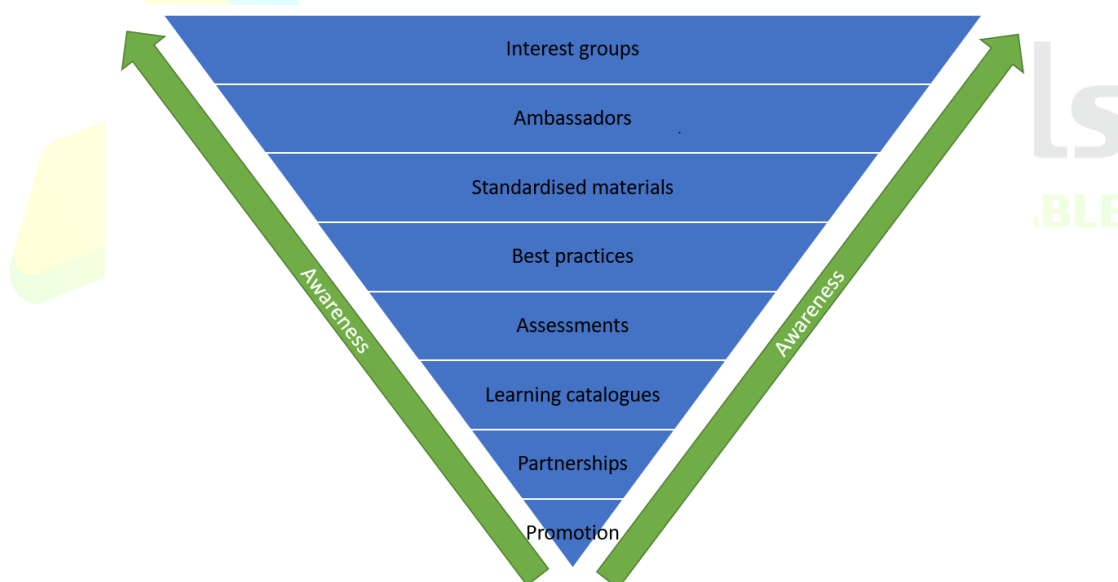


Figure 8 The inverted pyramid of energy skills awareness



3.9. Certifications available

Certifications impact the desire to acquire new competencies from a number of perspectives.

The investors want to be sure they get what they pay for. They want an organisation and/or a person with sufficient competency to perform work for them, in order to guarantee the quality of performed work. They also want to be able to check that the professional actually has the competency they advertise to have. Providing certificates and an easy way to show them is very important to the investors. Centraal Register Techniek in the Netherlands offers an easy-to-use QR-code-based tool, through which anyone can identify which certifications a professional has, on-site.

Organisations who provide EE materials and RES equipment want to make sure the professionals installing their materials and equipment will do so in the way it was intended to be used and will thus achieve the greatest benefit for the investor, which will ensure future investors will also decide to use their materials and equipment. To make sure that happens, such organisations often provide certifications of their own. Fragmat offers such for their hydro isolations.

Certifications of buildings and projects have also been developed, often to attract investment, as discussed in the previous chapters. In Spain, BREEAM ES offers such certificate schemes, as does the GBCe. They both also hosts a register of advisors, who can certify a building.

In the Netherlands, the Insula Certificatie organisation lists all companies certified in various aspects of insulation, along with those who had their certificate revoked, discontinued or are in the process of acquiring them. Before issuing the certificate, Insula takes into consideration the materials used and the process of installation. These are assessed in unannounced on-site visits. Along those, they also perform a company audit.

Professionals themselves also want to differentiate their expertise from their competitors', by showing the competencies they have achieved, as it enables them to find more work and charge higher prices. There are a number of certificates available on the topic of BIM, such as the ones offered by ACP in Spain, NET-UBIEP project. SERTUM in the Netherlands certifies people in commissioning, maintenance, and inspections, whilst NHK offer certification for consultants and installers of fireplaces, stoves and flues.

Organisations hiring professionals look whether their prospects possess such certificates, as it provides a safety mechanism for them to get the professionals with competencies they and the regulators require, and it enables them to promote their work and thus win more projects. Bodemenergie Nederlands provides such certificates for professionals who design, implement, maintain and manage geothermal energy systems.

In order to avoid the need for a customer to identify whether the professional has required certificates, there is a requirement in the Netherlands that all installation work of solar energy systems must be performed by a certified installer, and thus the professional's organisation must obtain Business Approval for the design, installation, management and maintenance of photovoltaic solar energy systems.



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Within the BUS initiative, projects have developed a number of certificates for the courses they created. Often, these certify instructors, trainers and trainees. Instructors are experts who are in charge of training the trainers, who in turn train the trainees. BEET project in North Macedonia offers lists of certified professionals, divided into the three groups, on their website.

3.10. Legal obligations promoting use of energy skills and their timelines

The Paris Agreement is a global, legally binding climate agreement. Its goal is to limit global warming to 2°C and try to limit it to 1.5°C.

The European Green Deal is one of the EU commission's 6 priorities for 2019-2024. Through it, the EU will achieve the goals of no net emissions of greenhouse gases by 2050.

The 2020 climate & energy package sets out three key targets:

- 20% cut in greenhouse gas emissions (from 1990 levels)
- 20% of EU energy from renewables
- 20% improvement in energy efficiency

It focuses on several areas to meet these targets:

- Emissions trading system
- National emission reduction targets
- Renewable energy – national targets
 - o Renewable Energy Directive
- Innovation and financing
 - o NER300 programme for renewable energy technologies and carbon capture & storage
 - o Horizon 2020
- Energy efficiency
 - o Measures are set out in the Energy Efficiency Directive

The 2030 climate & energy framework looks at the period between 2021 and 2030. Targets are:

- 40% cut in greenhouse gas emissions (from 1990 levels) - was reviewed and raised to 55%
- 32% of EU energy from renewables
- 32,5% improvement in energy efficiency

Through the 2050 long-term strategy the EU aims to be climate-neutral. The 2050 goal has been formalised through the European Climate Law. The ECL aims to ensure that all EU policies, sectors of economy and society contribute to this goal. Its objectives are:

- Set the long-term direction of travel for meeting the 2050 climate neutrality objective through all policies, in a socially fair and cost-efficient manner



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- Set a more ambitious EU 2030 target (revision of greenhouse gas emissions from 40% to 55%), to set Europe on a responsible path to becoming climate-neutral by 2050
- Create a system for monitoring progress and take further action if needed
- Provide predictability for investors and other economic actors
- Ensure that the transition to climate neutrality is irreversible

In line with this, all EU states must develop their national long-term strategies setting out how they will achieve the objectives.

There are a number of directives, mechanisms and tools focusing on Energy efficient buildings:

- Energy performance of buildings directive
- Renovation wave
- Long-term renovation strategies
- EU building stock observatory
 - Tool for monitoring energy performance of buildings across Europe
- Smart readiness indicator
 - Scheme for rating smart readiness of buildings
- Nearly zero-energy buildings
- Certificates and inspections
 - Energy performance certificates
 - Inspection of heating and air-conditioning systems
- Financing renovations
 - European Structural and Investment Funds (ESIF)
 - European Fund for Strategic Investments (EFSI)
 - Horizon 2020
 - ELENA facility

On the product level, there is the Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products.

Looking more specifically at skills, the European Skills Agenda sets out a 5-year plan to help individuals and their companies develop skills. Its focus is on strengthening sustainable competitiveness, ensuring social fairness, and building resilience. Its actions are grouped into four blocks:

- Collective action
- The right skills for jobs
- Lifelong learning
- Unlock investment in skills

OECD's initiative supports countries in creating an overarching approach to procurement that enables efficiency, fosters growth and accomplishes their strategic goals.



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As part of it, Green Public Procurement (GPP) helps countries procure more environmentally friendly products and services. The important aspect here is the evaluation of the whole life-cycle.

A document with a collection of best practices "Going Green: Best Practices for Sustainable Procurement" describes such initiatives taken by different countries. In the Netherlands, due to the ruling that Dutch public authorities must implement 100% sustainable procurement from 2015 onwards, the Rijkswaterstaat developed a methodology for infrastructure projects to ensure an innovative and high-quality solution. In Slovakia, an education process has taken place, in which they look at GPP and related issues, such as eco-labelling, energy labelling, green offices, etc. The result was a rise of green procurement contracts from 2,1% in 2011 to 5,0% in 2012.

In 2019, the 3rd Environmental Performance Review (EPR) was published for North Macedonia, as part of the UNECE EPR Programme. It enables North Macedonia with recommendations to help achieve the goals for the 2030 Agenda for Sustainable Development.

As part of the BIG-E initiative, a set of voluntary commitments have been made by participating countries and organisations to undertake green economy actions. Amongst others, Netherlands committed to the transformation of its construction and demolition sector under the circular construction approach, Slovakia committed to establishing a Green Education Fund, and Slovenia committed to developing and implementing the Framework Programme for Transition to a Green Economy.

The national energy agencies have established websites where all laws related to energy can be found in one place. However, these are in local languages...

The list of laws per partner country:

Case of Slovenia:

In Slovenia, the Integrated National Energy and Climate Plan 2030 lists the following goals related to the built environment:

- Lower the greenhouse gas emissions by 43% in the industry (which includes construction) and by 70% in buildings
- Achieve 27% share of renewable sources overall, and 67% (2/3) in buildings, 30% in industry
- Improve energy efficiency by at least 35% compared to 2007
- Lower energy consumption in buildings by 20% compared to 2005
- Increase the investments in R&D to at least 3% of GDP
- Increase investments in human capital
- Support organisations in their transition to climate neutral and circular economy

From the 31st of December 2020 all new buildings must be nZEB compliant. The same applies to public sector buildings from the 31st of December 2018.

In its Long-term strategy of energy refurbishment of buildings by 2050 document, Slovenia sets out its vision and goals, including the 2030 and 2040 goals:



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- Come close to net-zero emissions by investing refurbishing buildings with sustainable and low-carbon materials, and utilisation of reusable energy sources for heating
- Focus on lifecycle of buildings
- Construction industry will be a priority area for the transition into a low carbon circular economy

Sectorial goals by 2030:

- Private buildings
 - o Final energy use lowered by 25%, CO2 emissions lowered by 45%
 - o 16,061 million m2 single-family and 7,271 million m2 multi-family buildings to be refurbished
 - o Lower energy consumption by 6,05PJ (26%), with 36% of nZEBs
- Public buildings
 - o Final energy use lowered by 7%, CO2 emissions lowered by 57%
 - o 2,3 million m2 of buildings to be refurbished
 - o Lower energy consumption by 0,7PJ (20%), with 26% of nZEBs
- Private services buildings
 - o Final energy use lowered by 1%, CO2 emissions lowered by 51%
 - o 4,1 million m2 of buildings to be refurbished
 - o Lower energy consumption by 3,7PJ (16%), with 24% of nZEBs

To tackle energy efficiency on local level, Local energy concept (LEK) tool has been introduced. It includes approaches to implement efficient and sustainable energy services in private and public buildings in the local context.

Case of the Amsterdam, Netherlands:

Amsterdam has adopted a position, that they want to be a sustainable and energy efficient city. The goals they are pursuing are:

- 2030
 - o We aim to be a completely emissions-free city
 - o Our own municipal organization is sustainable
 - o We generate 80% of the electricity used by households using solar and wind energy
 - o We use 50% less raw materials
 - o We want to reduce CO2 emissions by 55% compared to levels in 1990
- 2040
 - o The city no longer uses natural gas
- 2050
 - o The city is climate adaptable
 - o We are using all suitable roofs to generate solar energy
 - o We are climate neutral
 - o Amsterdam is a circular city



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Along with the vision and goals, there are a number of policies available, further describing their strategy:

- Policy: Clean air
 - o Start at the source: preventing harmful emissions is better and ultimately cheaper than trying to combat them;
 - o Tackle what is achievable: prevent emissions from traffic, woodburning stoves and mobile equipment such as generators and construction vehicles;
 - o Deal with the most heavily polluted places first: the city centre has the most air quality blackspots and is the busiest part of the city;
 - o From corporate to private: business traffic drives the most kilometres and has more possibilities to clean up quicker than residents.
- Policy: Circular economy
 - o Built environment
 - Ambition 1: The transition to circular development requires a joint effort
 - Ambition 2: The City sets the right example by formulating circular criteria
 - Ambition 3: A circular approach to the existing city
- Policy: Phasing out natural gas
- Policy: Renewable energy
 - o Make existing homes more sustainable
 - o Reduce energy consumption by businesses, sports clubs, schools, and community organizations
 - o Encourage zero-energy construction
- Policy: Climate neutrality
 - o Built environment
 - Scale up the neighbourhood-by-neighbourhood approach to switch from natural gas
 - Develop sustainable sources for the heat networks
 - Evolve to a city-wide heating infrastructure
 - Make homes more energy-efficient
 - Make business markets more energy-efficient
 - Make public buildings more energy-efficient
 - Move to energy-neutral construction



4. Results from direct research, interviews and surveys

4.1. Experts' interviews

As part of the second stage, we conducted a one-on-one interview with the partners from Netherlands, and a country-wide interview with the partners from North Macedonia. Both approaches worked very well, as in the former the partner organisation had a wide set of sources to cover and in the latter approach, great collaboration and chemistry between the partners was obvious, and thus the partners were able to build on one-another's ideas and thoughts.

After the interviews we were able to return to the information sources collected as part of the Desk research stage, review them and filter the data.

4.2. World café workshop

4.2.1. World café discussion on the general scope of the survey

In order to organize this part of work, a two-part workshop was conducted on 10 December 2021, on following topics:

- First workshop - Title: How can we identify through the survey which initiatives had the most positive effect on the construction industry professionals and why?
- Second workshop - Title: How can we identify as many (both quantitative and qualitative) industry professionals and encourage them to participate in the survey?

The overall workshop was organized in an interactive manner, initiating intense communication and requesting feedback on questions that are subject of matter.



Figure 9 Sharing ideas about the organization of the survey



Figure 10 Sharing ideas pool on the approach for engagement of industry professionals

The results of these interactive workshops served as a basis for creating the survey questions, and to identify the approach how to reach as many construction professionals and encourage them to give input.

4.2.2. World café discussion on the specifics of the survey

An additional working meeting (in the frame of the 4th CM) was realized on the topic of organizing an Interregional Survey on the existing energy skills to provide data on the Status Quo on existing EE measures (defining the scope, structure, questions, method and channels for its implementation). As the goal of WP2 is to understand current status of energy skills and based on what works or not, help influence the strategy that will inform subsequent work packages. The more important things for this survey are mapping the market and need to understand how beneficial the past activities are for the users:

- Understand visibility, value and validity of energy skills available on the market;
- Understand future trends;
- Understand visibility, value and validity of formal recognition available on the market

Goals of the implementation of the Survey were defined upon mutual agreement between the partners:



1. Quantitative goals>

- total number of responses

NM- 50 individuals and 10 Organizations;

SI-50 and 10;

SK-70 and 12;

ES-150 and 20 ;

NL-100 and 15.

2. Percentage of responses by target audience group

-equal percentages

3. Qualitative goals

-get the existing status of 3V of skills.

Then the guiding principles for structuring the survey questionnaire were consensually defined:

Target audience

-Diverse

-Groupings

-Individuals

Lifecycle phases (design, construction, operations, maintenance)

Education (lower, middle, higher)

Seniority in organizations (specialists, mid management, higher management)

-Organizations

Delivering work

Industry bodies (chambers, professional organizations, centers of excellences, etc)

Training organizations

Producing EE/RES materials equipment

-Investors

Public



Private (families, organizations etc)

Survey delivery

-Virtual

Social media (LinkedIn, Facebook, Twitter)

Email

Webinars (for now we have none)

-In person

Events (conference, seminars, etc.

-Organizations (design, construction, manufacturing, investors, etc.

-Industry centers (where people go to get information about tax breaks, new skills, new projects, etc.

-Tools (desktop, mobile version, QR based voting, Kiosk mode-conferences, chat boots on STS website, buttons-green/red;

Segmentation -2 segments (individual and organization)

Survey should be...

-Easy to fill out

-Close ended questions;

-Include only relevant questions (survey logic)

-Simple questions- easy to understand, short, focused only on 1 thing

-Simple layout

-Around 7 questions

-Include a timer on top of each page

-Question numbering on top of each page

The final structure of the survey questionnaire was adopted at the 5th CM on 28.03.2022, and implemented during April-May.



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4.3. Survey

4.3.1. Survey structure and organisation

In the course of the project we executed two survey for individuals and for companies, as indicated in the figures bellow, which was first consulted with the consortium and later on tested in each country.

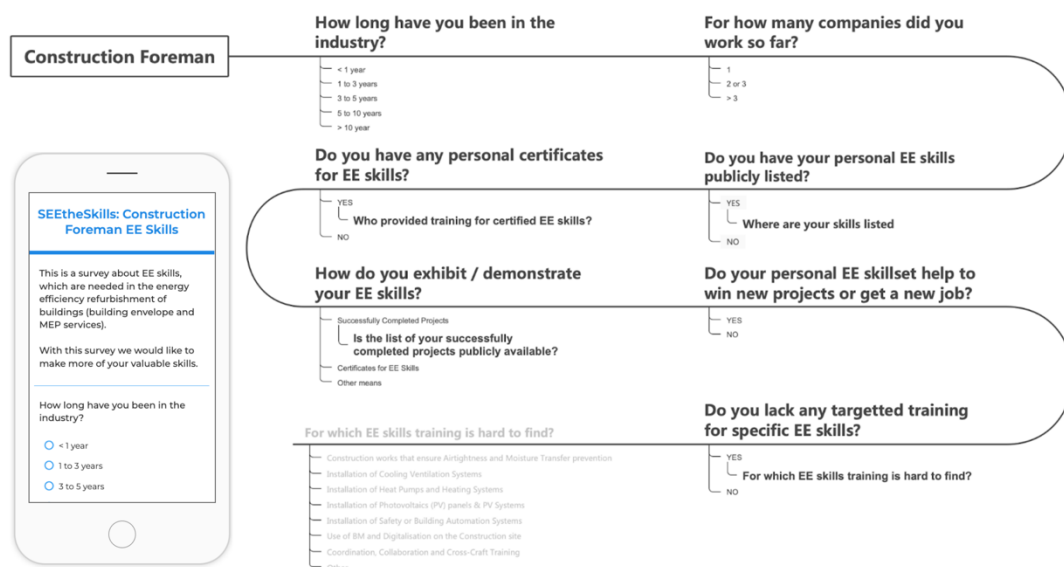


Figure 11 Survey's question loop for the individual professionals

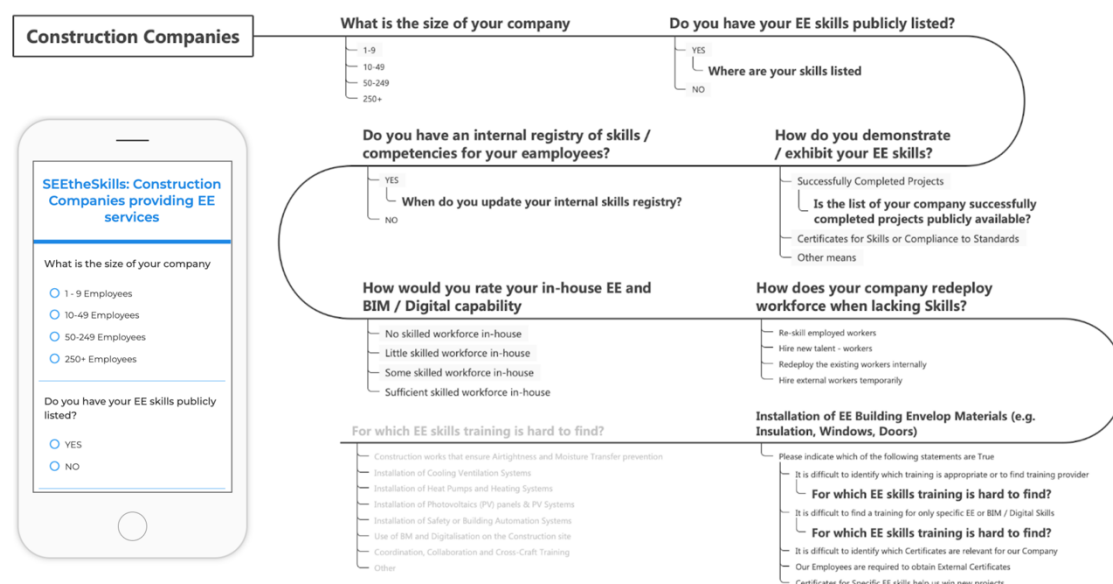


Figure 12 Survey's question loop for the construction companies



4.3.2. The structure of the survey respondents

Major requirements for the execution of the survey were as follow:

- Include relevant individuals and organizations
- Entropic information: reduce the number of questions as much as possible
- Provide flexible approach to multi-ligunal and multi-cultural environment
- Support various forms of execution> mobile,

The following groupings were considered:

- Individuals that cover:
 - Lifecycle phases (design, construction, operations, maintenance)
 - Various education level (lower, middle, higher)
 - Seniority in organisation (specialists, mid-management, higher-management)
- Organizations:
 - Construction companeis (designers general contractors)
 - Public and private sector investors
 - Industry bodies (chambers, professional organisations, centres of excellence, etc.)




Collectively we got over 400 respondents from individuals and representatives of the companies that operate in the field of EE. The whole set of results for the individuals working in the EE are presented in Annex 3.

4.3.3. The results and discussion on the survey responses from the individuals

Below an overview of the results and conclusions is given as very important when coming from experienced representatives from the industry. This is indicated in the structure of the respondents, showing that 85% of the respondents are highly experienced professionals with more than 10 years of working experience in the sector.



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Q2	How long have you been in the industry?				
Σ f* s f  	Answers	Frequency	Percent	Valid	Cumulative
	1 (< 1 year)	2	1%	1%	1%
	2 (1 to 3 years)	5	1%	1%	2%
	3 (3 to 5 years)	10	3%	3%	5%
	4 (5 to 10 years)	38	10%	10%	15%
	5 (> 10 year)	312	84%	85%	100%
Valid 	Valid	367	99%	100%	
	Average	4.8	Std. deviation	0.6	

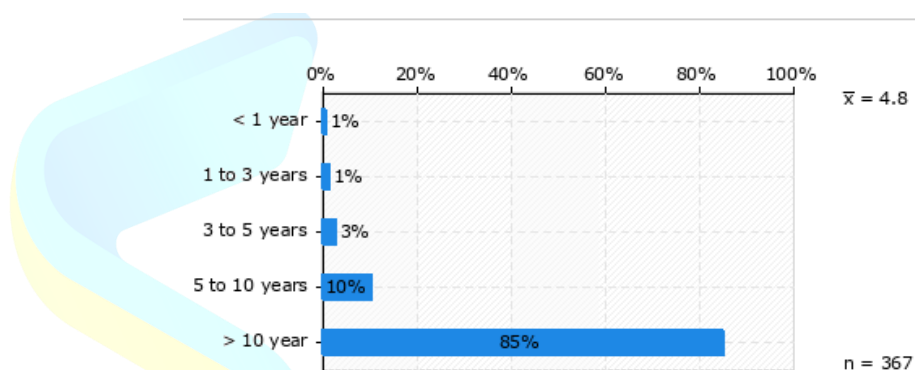





Figure 13 The structure of the respondents by experience

Q3	For how many companies have you worked so far?				
Σ f* s f  	Answers	Frequency	Percent	Valid	Cumulative
	1	57	15%	16%	16%
	2 (2 or 3)	144	39%	39%	55%
	3 (> 3)	165	45%	45%	100%
Valid 	Valid	366	99%	100%	
	Average	2.3	Std. deviation	0.7	



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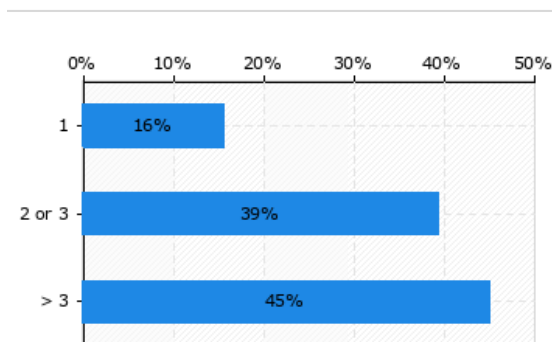


Figure 14 The level of experience of the respondents

Regarding the visibility of the skills, an important feedback that proves the need to better manage available skillsets is that less than 25 % of respondents have some form of published (announced, visible) information about their EE skills.

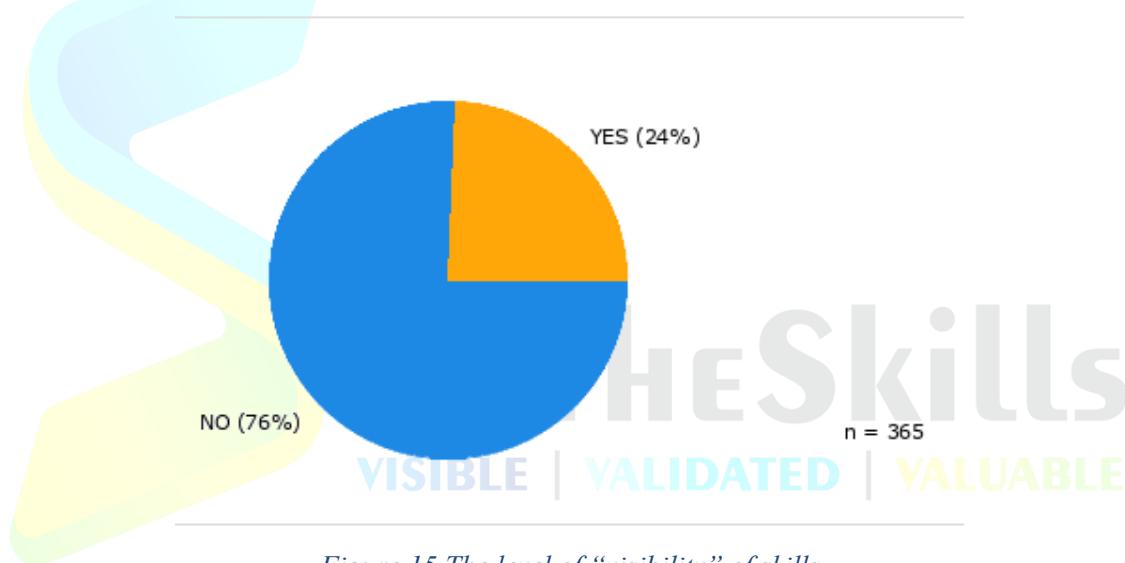


Figure 15 The level of "visibility" of skills

The respondents that have declared that have publicly listed skillset have provided the following information about the platform where their skillset is announced.



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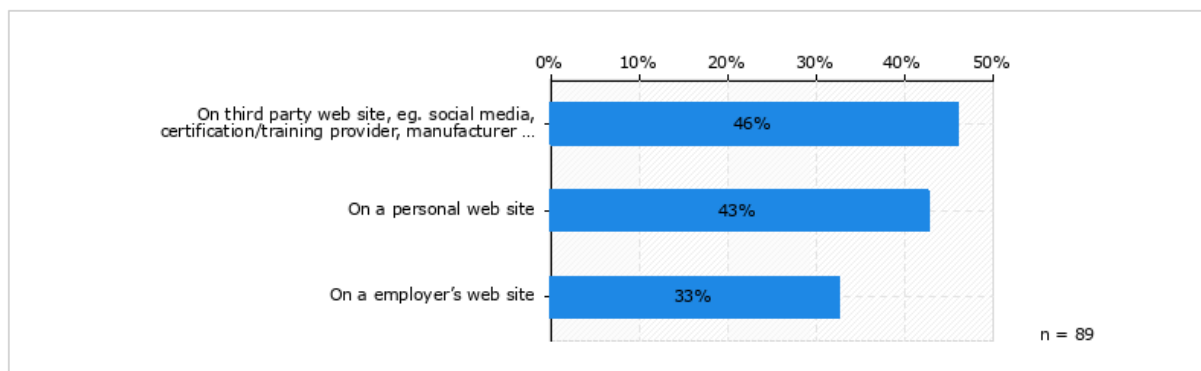


Figure 16 The platform where the skillsets are announced

The “origin” of the skills is very useful information, obtained from the survey. A very significant share of 82% of the respondents have declared that have achieved their skills through the trainings organized by professional organisations. So this channel for skilling and upskilling is the most significant one and should be further supported and developed.

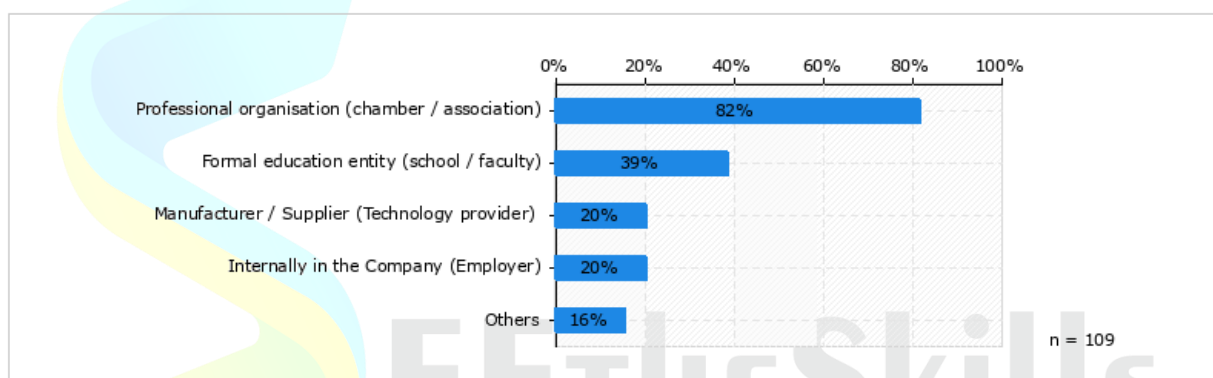


Figure 17 The provider of the training and certification

Only 30 % of respondents have formal documents that certify their skills. So more usually they use their completed projects as a reference list to prove their professional competences in terms of being competitive in job search.

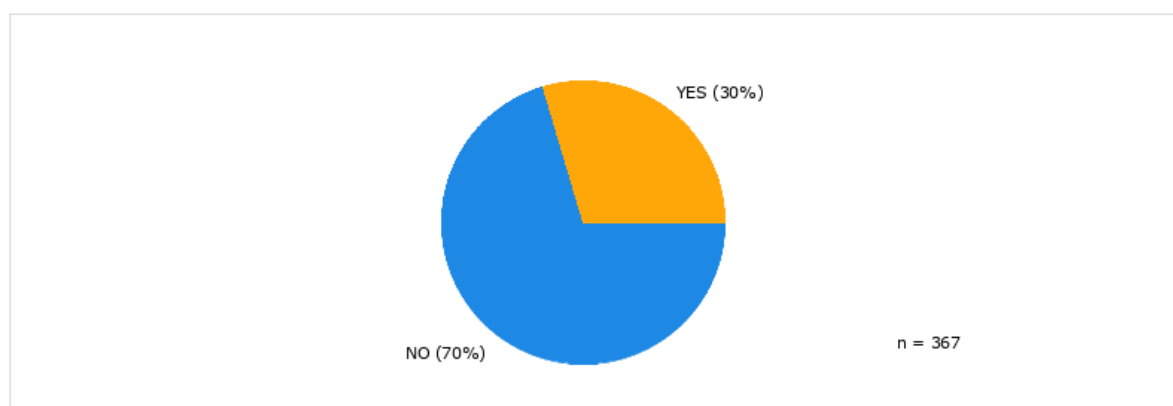


Figure 18 The share of respondents that have valid certification documents that confirm their skillset



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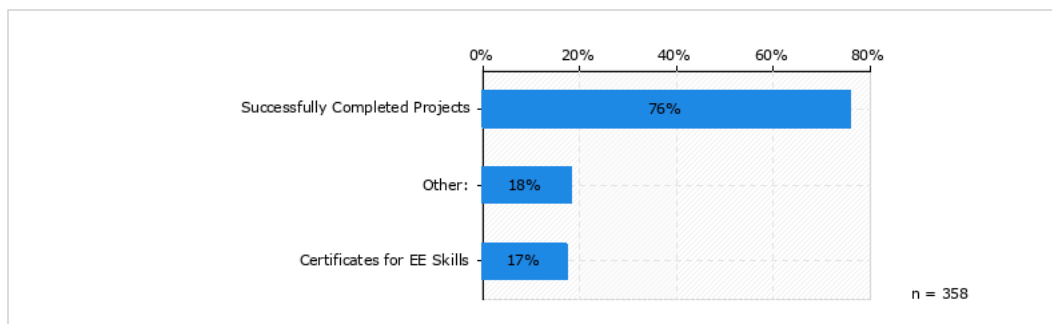


Figure 19 Used assets to confirm the competences in job search

Maybe the most important information obtained from the survey is the identification of the training gap. Regarding the lack of training the respondents identified the need for better coordination and collaboration and the creation and offering of Cross-Craft Trainings, as the most required one. Not much below is the training for installation of PV systems, and also Heat pumps and HVAC systems. The need of the training offer for use of BIM on construction sites is also in the top level position on the list that will express the demand of trainings and the field where an action is necessary.

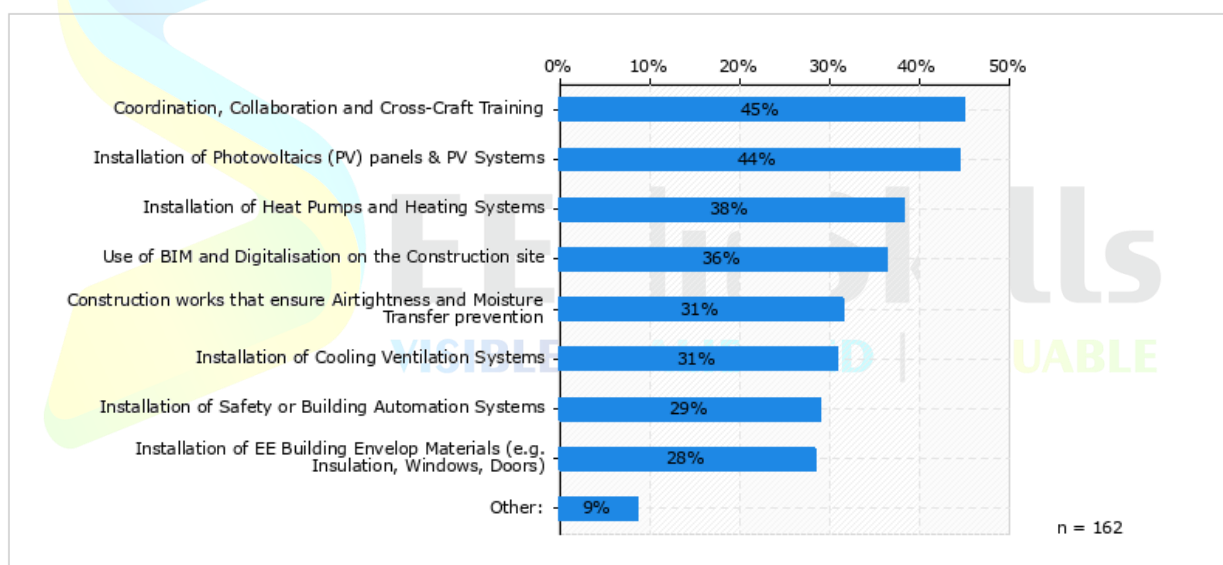


Figure 20 The identified training priorities



4.3.4. The results and discussion on the survey responses from the companies

The results from the survey where respondents were the construction companies' owners and managers have shown their perspective and identified needs for actions in the sector in order to provide the necessary skilled professionals.

First information obtained was that in the sector, the share of the small and medium size companies is much more expressed than the share of large construction companies, with more 91% in comparison to 9 %, accordingly.

Regarding the public visibility of the skillsets of the employees, the companies' owners have answered that less than 1/3 of the employees have publicly listed skills and it is mainly at the companies' web page, in more than 80% of cases (see the detailed results in Annex 4).

The companies are presenting the skills of their employees with the valid certificates proving their skills and competences, along with the certificates for the compliance of the performed work with the adequate standards.

Regarding the visibility of the reference list of the completed successful projects, the results show that only 50% have publicly listed this list, while the other half is providing the list on the request of the clients.

Regarding the results that are stressing the need for the creation of the Registry of skilled professionals, only 25% of the companies have such a registry, while the others have no record nor the public listing of the skilled employees.

There was a specific question regarding the BIM skills and digital competence of the employees. The companies owners have provided answers that specify that only around 30% of the employees are digitally capable. But the companies usually decide to employed external BIM skilled professionals than to reskills the existing workforce.

Regarding the level of awareness of the companies that the skills will bring value to the company itself, there are nondefined attitudes, but regarding the identified need for trainings and upskilling, these respondents have provided the following opinion:



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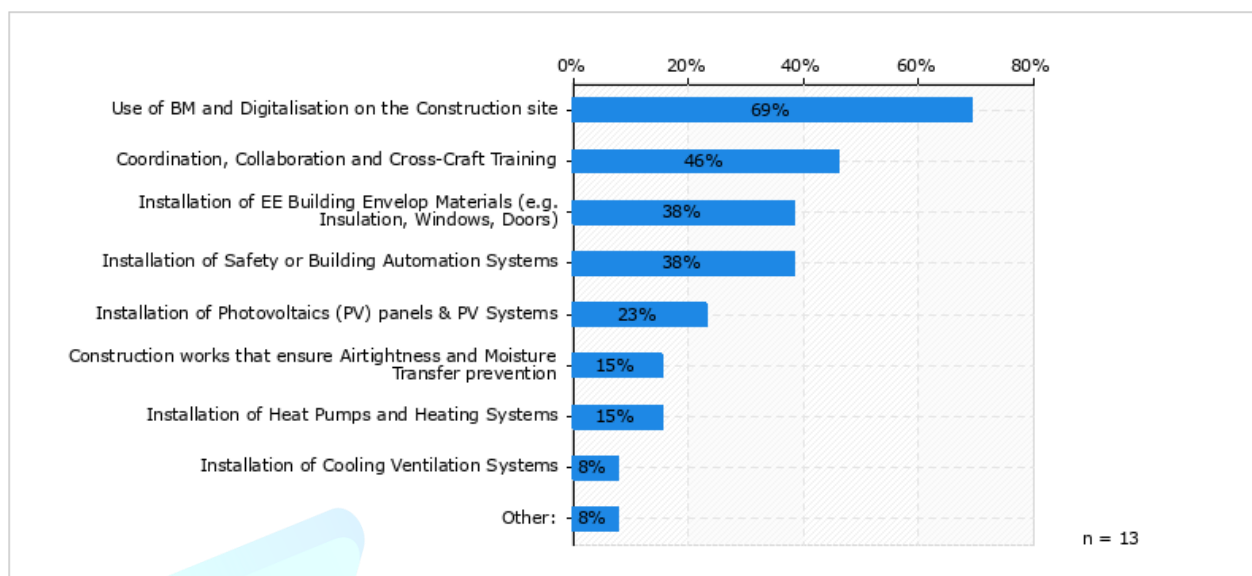


Figure 21 The need for training as identified by the companies' owners

Here the conclusions are a little bit different than obtained by the individual respondents. The most expressed need is for the BIM and digital skills, than come the cross-craft skills, after which are the skills for proper installation of the envelop materials and automaton systems.

5 Discussion and Conclusion

The overall survey conducted encompassed of several different approaches, providing a very comprehensive way to make an overview of the current status of the energy skills in the project countries area.

The obtained results will serve in the next phases of the project to create a corresponding actions in order to provide the necessary environment and to enable upskilling and reskilling of building workforce in accordance with the identified needs, gaps, and technology advancements.

Some general conclusions are toward:

- The actions to provide the VISSIBILITY of skills are more than necessary, as identified in both the desk research and the survey results. This will serve to adequately concept the creation of the Integrated repository of skills
- The survey have identified the existing training schemes and also the skills gap, so this will be used to define the content and scope of the new training schemes to be developed within the project and that will be a part of BUS advisor App, to serve for the purpose of VALIDATION of skills
- The most important work in the next project phases should be focused on the VALUE of the skills and finding mechanisms to express the value and also to raise the demand for skills. This is very much expressed from the survey results.



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Annex 1 List of available training schemes

Name	Country	Link	Description
PI Adult Education Center	NM	http://cov.gov.mk/en/all-courses/	EE, RES
Energy control of buildings	NM	https://www.ea.gov.mk/energetska-efikasnost/energetski-kontroli-na-zgradi/	Energy control
Skills4Future	NM	https://skills4future.mk/n-auri-novi-veshtini/	BIM, PV/PVT
EUREM	NM, SK, SI, ES	https://training.eurem.net/course/index.php	Energy Manager
BIMcert	NM	https://platform.energybimcert.eu/	BIM, EE
TRAINEE	NM	https://ks.org.mk/en/training-catalogue/	EE, RES, BIM
USAID	NM	https://solar.org.mk/%d1%81%d0%b5%d1%80%d1%82%d0%b8%d1%84%d0%b8%d0%ba%d0%b0%d1%82%d0%b8-%d0%b7%d0%b0-20-%d1%83%d1%87%d0%b5%d1%81%d0%bd%d0%b8%d1%86%d0%b8-%d0%bd%d0%b0-%d0%be%d0%b1%d1%83%d0%ba%d0%b0%d1%82%d0%b0-%d0%b7%d0%b0/	RES
Knauf	NM	https://knauf.mk/training/	EE
REHAU	NM	https://www.rehau.com/mk-mk	EE
NEWCOM	SK, NL	https://www.newcomtraining.com/trainings	nZEB
NET UBIEP	SK, ES, NL	http://www.net-ubiep.eu/e-learning/	BIM
QualitEE	SK, SI, ES	https://qualitee.eu/gb/training-modules/	EE
PROF/TRAC	NL, ES, SI	http://proftrac.eu/trainin-g-material/search-training-material.html	nZEB
ingREeS	SK	https://vzdelavanie.sk/si/sk/ingrees	EE, digitalisation
CraftEdu	SK	https://database.crafted.eu/cs/courses	EE
CEN-CE	SK	https://lms.cen-ce.eu/	CEN standards



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Aldren	SK, ES	https://aldren.eu/modules_and_tools/	EE
SiBIM	SI	https://www.sibim.eu/course-material	BIM
CEC5	SI, SK	http://www.projectcec5.eu/strona-39-ee_skills_and_demonstration.html	EE
Construction Blueprint	SI, ES	https://constructionblueprint.eu/online-course/	EE, digitalisation, circular economy
Faculty of Architecture	SI	http://www.fa.uni-lj.si/default.asp?id=2501	nZEB
EEPLIANT	SI, ES	https://www.prosafe.org/images/html_files/elearning/EEPLIANT/index.html	Energy labelling
BIMplement	ES, NL	https://www.bimplement-project.eu/project/bimplement-kit/	EE, BIM
AZEB	ES, NL	https://azeb.eu/learn/courses/17-step-azeb-roadmap/	nZEB
Construye2020	ES	http://construye2020.eu/en/plataforma-sobre-formacion-profesional/que-curso-necesito	EE
Level(s)	ES, NL	https://ec.europa.eu/environment/levels/lets-meet-levels/elearning-and-tools_en	EE, lifecycle
Construction Labor Foundation	ES	https://www.trabajoenconstruccion.com/MOOC/ACCESO/MOOCsFlc.aspx	BIM, EE
mpower	ES, NL	https://municipalpower.org/learning-support-streams/#1	EE
European Heritage Academy	ES	https://learn.european-heritage-academy.eu/	EE, digitalisation, heritage
Agencia de Certificación Profesional	ES	https://www.agenciaticertificacionprofesional.org/bim-manager/#1476180105485-1ce5a215-a073	BIM
IVE	ES	https://www.five.es/categoria-producto/formacion/cursos-y-jornadas/	EE, lifecycle
Atecyr	ES	https://www.atecyr.org/recursos-tecnicos/formacion/progr	EE



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BREEAM ES	ES	https://breeam.es/formacion/	BREEAM
Interreg Sudoe Rehabilitate	ES	http://rehabilitate.eu/en/online-training/available-courses	EE
BUSTrainers	ES	http://formacion.ecotrainers.eu/moodle/?lang=en	EE, energy labelling
Green building council Espana	ES	https://gbce.es/formacion/	VERDE
RentCal	ES, NL	http://www.rentalcal.eu/training	EE
EUREMnext	ES	https://www.energymanager.eu/en/eurem-training-contents-and-structure/	Energy manager
TVVL	NL	https://www.tvvl.nl/cursusaanbod	various
BUS NL	NL	https://buildupskillsnl.ansspring.com/do?action=viewCatalog	EE
BREEAM NL	NL	https://www.breeam.nl/trainingen	BREEAM
DGBC Academy	NL	https://www.dgbc.nl/dgbc-academy-73	EE, BREEAM
Master Renewable in Energy	NL	https://master.eurec.be/universities/core/hanze-university/	EE
Bouwend Nederland	NL	https://www.bouwendnederland.nl/service/trainingen-bnl-academy	BIM, QA, PM
Professional Training Installer Fireplaces, Stoves and Flues	NL	https://stichting-nhk.nl/vakopleiding/	EE
Climatepedia	NL	https://klimapedia.nl/leerbundel/milieuprestatie/	EE, lifecycle
Rijksdienst voor Ondernemend Nederland	NL	https://www.rvo.nl/onderwerpen/duurzaam-ondernemen/gebouwen/opleiding-advies-en-certificering	Energy advisor



Annex 2 Companies for design and production of EE materials

Company	Country		Link	Products
Camel Solar	NM		http://www.camel-solar.com/cs/	Solar thermal technology
Leov company	NM		http://leov.com.mk/	Water heaters, solar panels, electrical heaters, stoves
Euroterm	NM		https://www.euroterm.com.mk/	Heating (boilers, radiators, underfloor heating, circulation pumps, valves, copper pipes and fitting, brass fitting), Air conditioning (heat pumps, air conditioning, fans, chillers), Solar systems (solar collectors, water heaters)
Pikcel group	NM		https://www.pikcellgroup.mk/en/about-pikcell-group/	Solar thermal technology
Metalotehnics	NM		https://metalotehnika.mk/	Thermo liquid insulations, waterproofing
Pevalit	NM		https://pevalit.com/en/	Plasters, facade adhesives, paints, silicone sealants, polyurethane adhesive foam, EPS
Fragmat	Multiple		https://www.fragmat.si/en/construction-program	EPS, XPS, waterproofing bitumen membranes, wood wool boards, underfloor heating
Ecopor	NM		http://ekopor.com.mk/	EPS
PO FIX	NM		https://pofix.com/en/home/#	EPS, XPS, adhesives
Velux	SI		https://www.velux.si/	Windows, blinds and shutters, smart home
Pichler	SI		https://www.pichler.si/	Air conditioning,
Agregat	SI		https://www.agregat.si/	Ventilation systems, electric heaters
Rihter	SI		https://www.rhter.si/	Prefabricated houses
Marles	SI		https://www.marles.com/	Prefabricated houses
Lumar	SI		https://www.lumar.si/	Prefabricated houses
ISO Chemie	SI		https://www.iso-chemie.eu/en/home	Sealing solutions
Wienerberger	SI		https://www.wienerberger.si/	Wall, facade, roof systems
MA dizajn	SI		http://madizajn.si/novosti.php	Sealant systems
Schock	SI		https://www.schoeck.com/si/isokorb	Thermal insulation and load bearing solutions
JUB	SI		https://www.jub.si/	Paint, EPS, waterproofing
Rigips	SI		http://si.rigips.com/isover/o-isoverju.html	Thermal insulation
Ytong	SI		https://www.ytong.si/	Thermal insulation and load bearing solutions
Knauf insulation	SI		https://www.knaufinsulation.si/	Thermal insulation
Fibran	SI		https://fibran.si/	XPS, waterproofing,



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Annex 3 Detailed survey results for individuals

Q2	How long have you been in the industry?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (<1 year)	2	1%	1%	1%
	2 (1 to 3 years)	5	1%	1%	2%
	3 (3 to 5 years)	10	3%	3%	5%
	4 (5 to 10 years)	38	10%	10%	15%
	5 (>10 year)	312	84%	85%	100%
Valid	Valid	367	99%	100%	

Q3	For how many companies have you worked so far?				
	Answers	Frequency	Percent	Valid	Cumulative
	1	57	15%	16%	16%
	2 (2 or 3)	144	39%	39%	55%
	3 (>3)	165	45%	45%	100%
Valid	Valid	366	99%	100%	

Q4	Do you have your personal EE-skills publicly listed?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	89	24%	24%	24%
	2 (NO)	276	75%	76%	100%
Valid	Valid	365	99%	100%	

Q5	Where are your EE-skills listed?				
	Answers	Frequency	Percent	Valid	Cumulative
Q5a	On a personal web site				
	0	51	14%	57%	57%
	1	38	10%	43%	100%
Valid	Valid	89	24%	100%	
Q5b	On a employer's web site				
	0	60	16%	67%	67%
	1	29	8%	33%	100%
Valid	Valid	89	24%	100%	
Q5c	On third party web site, eg. social media, certification/training provider, manufacturer ...				
	0	48	13%	54%	54%
	1	41	11%	46%	100%
Valid	Valid	89	24%	100%	

Q6	Do you have any personal certificates for EE-skills?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	109	29%	30%	30%
	2 (NO)	258	70%	70%	100%
Valid	Valid	367	99%	100%	



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Q7	Who provided training for certified EE-skills?				
	Answers	Frequency	Percent	Valid	Cumulative
Q7a	Formal education entity (school / faculty)				
	0	67	18%	61%	61%
	1	42	11%	39%	100%
Valid	Valid	109	29%	100%	
Q7b	Professional organisation (chamber / association)				
	0	20	5%	18%	18%
	1	89	24%	82%	100%
Valid	Valid	109	29%	100%	
Q7c	Manufacturer / Supplier (Technology provider)				
	0	87	24%	80%	80%
	1	22	6%	20%	100%
Valid	Valid	109	29%	100%	
Q7d	Internally in the Company (Employer)				
	0	87	24%	80%	80%
	1	22	6%	20%	100%
Valid	Valid	109	29%	100%	
Q7e	Others				
	0	92	25%	84%	84%
	1	17	5%	16%	100%
Valid	Valid	109	29%	100%	

Q8	How do you present-demonstrate your EE- skills?				
	Answers	Frequency	Percent	Valid	Cumulative
Q8a	Successfully Completed Projects				
	0	86	23%	24%	24%
	1	272	74%	76%	100%
Valid	Valid	358	97%	100%	
Q8b	Certificates for EE Skills				
	0	296	80%	83%	83%
	1	62	17%	17%	100%
Valid	Valid	358	97%	100%	
Q8c	Other:				
	0	293	79%	82%	82%
	1	65	18%	18%	100%
Valid	Valid	358	97%	100%	

VISIBLE | VALIDATED | VALUABLE

Q9	Is the list of your successfully completed projects publicly available?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (Yes)	61	16%	22%	22%
	2 (No, but when used it is validated by clients)	164	44%	60%	83%
	3 (No, we just list completed projects)	47	13%	17%	100%
Valid	Valid	272	74%	100%	

Q10	Do your personal EE-skillset help to win new projects or get a new job?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	177	48%	49%	49%
	2 (NO)	187	51%	51%	100%
Valid	Valid	364	98%	100%	



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Q11	For which type of projects the EE skillset is a must?				
	Answers	Frequency	Percent	Valid	Cumulative
Q11a	Public Projects				
	0	52	14%	30%	30%
	1	124	34%	70%	100%
Valid	Valid	176	48%	100%	
Q11b	Private Projects				
	0	81	22%	46%	46%
	1	95	26%	54%	100%
Valid	Valid	176	48%	100%	
Q11c	For None Explicitly				
	0	136	37%	77%	77%
	1	40	11%	23%	100%
Valid	Valid	176	48%	100%	

Q12	Do you lack any targetted training for specific EE-skills?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	166	45%	46%	46%
	2 (NO)	198	54%	54%	100%
Valid	Valid	364	98%	100%	

Q13	For which EE skills training is hard to find?				
	Answers	Frequency	Percent	Valid	Cumulative
Q13a	Installation of EE Building Envelop Materials (e.g. Insulation, Windows, Doors)				
	0	116	31%	72%	72%
	1	46	12%	28%	100%
Valid	Valid	162	44%	100%	
Q13b	Construction works that ensure Airtightness and Moisture Transfer prevention				
	0	111	30%	69%	69%
	1	51	14%	31%	100%
Valid	Valid	162	44%	100%	
Q13c	Installation of Cooling Ventilation Systems				
	0	112	30%	69%	69%
	1	50	14%	31%	100%
Valid	Valid	162	44%	100%	
Q13d	Installation of Heat Pumps and Heating Systems				
	0	100	27%	62%	62%
	1	62	17%	38%	100%
Valid	Valid	162	44%	100%	
Q13e	Installation of Photovoltaics (PV) panels				
	0	90	24%	56%	56%
	1	72	19%	44%	100%
Valid	Valid	162	44%	100%	
Q13f	Installation of Safety or Building Automation Systems				



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Q4	Do you have your personal EE-skills publicly listed?				
Σ f* s f	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	89	24%	24%	24%
	2 (NO)	276	75%	76%	100%
Valid +	Valid	365	99%	100%	
	Average	1.8	Std. deviation	0.4	

Q5	Where are your EE-skills listed? (Multiple answers are possible) (Units / Counts)				
Σ f* s f	Subquestion	Frequency	Valid	% - Valid	% -
Q5a	On a personal web site	38	89	43%	370
Q5b	On a employer's web site	29	89	33%	370
Q5c	On third party web site, eg. social media, certification/training provider, manufacturer ...	41	89	46%	370
	Total valid		89		370

Q6	Do you have any personal certificates for EE-skills?				
Σ f* s f	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	109	29%	30%	30%
	2 (NO)	258	70%	70%	100%
Valid +	Valid	367	99%	100%	
	Average	1.7	Std. deviation	0.5	



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Annex 4 Detailed survey results for companies

Q2	What is the size of your company				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (1 - 9 Employees)	21	58%	60%	60%
	2 (10-49 Employees)	11	31%	31%	91%
	3 (50-249 Employees)	1	3%	3%	94%
	4 (250+ Employees)	2	6%	6%	100%
Valid	Valid	35	97%	100%	

Q3	Do you have your EE skills publicly listed?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	10	28%	29%	29%
	2 (NO)	25	69%	71%	100%
Valid	Valid	35	97%	100%	

Q4	Where are your skills listed				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (Company web site)	8	22%	80%	80%
	2 (Third party portal (chamber, association, manufacturer))	2	6%	20%	100%
	3 (Social Media)	0	0%	0%	100%
Valid	Valid	10	28%	100%	

Q5	How do you exhibit / demonstrate your EE skills?				
	Answers	Frequency	Percent	Valid	Cumulative
Q5a	Successfully Completed Projects				
	0	9	25%	29%	29%
	1	22	61%	71%	100%
Valid	Valid	31	86%	100%	
Q5b	Certificates for Skills				
	0	28	78%	90%	90%
	1	3	8%	10%	100%
Valid	Valid	31	86%	100%	
Q5c	Certificates for Compliance to Standards				
	0	29	81%	94%	94%

Q6	Is the list of your successfully completed projects publicly available?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (Yes)	9	25%	41%	41%
	2 (No, but when used it is validated by clients)	11	31%	50%	91%
	3 (No, we just list completed projects)	2	6%	9%	100%
Valid	Valid	22	61%	100%	



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Q7	Do you have an internal registry of skills / competencies for your employees?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (YES)	9	25%	26%	26%
	2 (NO)	25	69%	74%	100%
Valid	Valid	34	94%	100%	

Q8	When do you update your internal skills registry?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (At Regular Intervals (eg. Yearly))	3	8%	33%	33%
	2 (At Specific Events or Statutes (employing new staff, new technology))	4	11%	44%	78%
	3 (None of the above)	2	6%	22%	100%
Valid	Valid	9	25%	100%	

Q9	How would you rate your in house EE and BIM / Digital capability				
	Answers	Frequency	Percent	Valid	Cumulative
Q9a	EE Skills				
	1 (No skilled workforce in-house)	11	31%	32%	32%
	2 (Little skilled workforce in-house)	6	17%	18%	50%
	3 (Some skilled workforce in-house)	10	28%	29%	79%
	4 (Sufficient skilled workforce in-house)	7	19%	21%	100%
Valid	Valid	34	94%	100%	
Q9b	BIM / Digital Skills				
	1 (No skilled workforce in-house)	13	36%	41%	41%
	2 (Little skilled workforce in-house)	3	8%	9%	50%
	3 (Some skilled workforce in-house)	5	14%	16%	66%
	4 (Sufficient skilled workforce in-house)	11	31%	34%	100%
Valid	Valid	32	89%	100%	

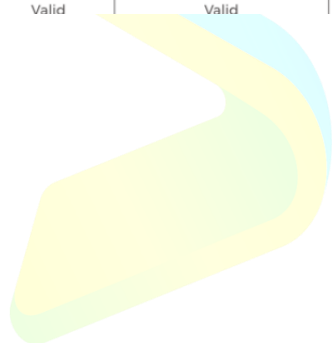
VISIBLE | VALIDATED | VALUABLE

Q10	How does your company redeploy workforce when lacking EE or BIM / Digital Skills				
	Answers	Frequency	Percent	Valid	Cumulative
Q10a	Re-skill employed workers				
	0	20	56%	63%	63%
	1	12	33%	38%	100%
Valid	Valid	32	89%	100%	
Q10b	Hire new talent - workers				
	0	22	61%	69%	69%
	1	10	28%	31%	100%
Valid	Valid	32	89%	100%	
Q10c	Redeploy the existing workers internally				
	0	28	78%	88%	88%
	1	4	11%	13%	100%
Valid	Valid	32	89%	100%	
Q10d	Hire external workers temporarily				
	0	14	39%	44%	44%
	1	18	50%	56%	100%
Valid	Valid	32	89%	100%	



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Q11	Please indicate which of the following statements are True				
	Answers	Frequency	Percent	Valid	Cumulative
Q11a	It is difficult to identify which training is appropriate or to find training provider				
	0	19	53%	70%	70%
	1	8	22%	30%	100%
Valid	Valid	27	75%	100%	
Q11b	It is difficult to find a training for only specific EE or BIM / Digital Skills				
	0	15	42%	56%	56%
	1	12	33%	44%	100%
Valid	Valid	27	75%	100%	
Q11c	It is difficult to identify which Certificates are relevant for our Company				
	0	13	36%	48%	48%
	1	14	39%	52%	100%
Valid	Valid	27	75%	100%	
Q11d	Our Employees are required to obtain External Certificates				
	0	23	64%	85%	85%
	1	4	11%	15%	100%
Valid	Valid	27	75%	100%	
Q11e	Certificates for Specific EE skills help us win new projects				
	0	22	61%	81%	81%
	1	5	14%	19%	100%
Valid	Valid	27	75%	100%	



EETheSkills

VISIBLE | VALIDATED | VALUABLE