



Title Report: D3.4 - HP Skills and Competency Framework

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Based on T3.1 (Training Providers Survey (M1-M10) (EHPA, LIT, IERC, CTA, ESV, RINA-C)) and T3.2 (National and European Union Prospective Training Frameworks Analysis (M1-M10) (EHPA, LIT, IERC, CTA, ESV, RINA-C)), coupled with insights from T2.3 (Heat Pump Experts - Survey of Skills Needs & Opportunities (M3-M6) (IERC, EHPA, LIT, CTA)) and T4.1 (Evaluation of current public and market acceptance of HPs (M1-M6) (LIT, EHPA, IERC, ESV, CTA, RINA-C)) a comprehensive picture of the diverse engaged stakeholders, their upskilling characteristics, current status, continues learning and adaptation barriers, as well as future opportunities can emerge. EHPA drafted a HP Skills Competency Framework by Month 12 of the project which was analysed by all partners at Project Meeting 2. On each step of the process, the competency framework was presented to the sector through a consultative process involving several mechanisms, that included:

- Stakeholder workshops through its members to gain feedback.
- Surveys aimed at receiving feedback from EU and International stakeholders with a mechanism for feedback to be provided.
- LIT, ESV and CTA engaged with their National HP Expert Group to gain feedback and consideration on the framework. In addition, was sought from Observer Regions. This was added in the form of interviews.
- EHPA engaged its members and their extensive expertise in the HP sector at its annual Forum. This was added upon via desk research and looking into competency models from other fields.
- EHPA presented the Draft Framework, surveys and events at key events targeted at stakeholders in the field (e.g., Chillventa, EHPA Forum)

Based on the feedback received, and the results and outcomes from WP5, EHPA amended and updated the Competency Framework for finalisation in Month 28.

This document refers to designing a Heat Pump Skills and Competency Framework, with a final document being prepared as part of D3.3.2, using the resources and inputs explained above.

The contents of this publication are the sole responsibility of the project partners involved in the present activity and do not necessarily represent the view of the European Commission and its services nor of any of the other consortium partners. This deliverable should be seen as draft and will only be final after final approval by the European Commission.

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1 Executive summary

HP4All brings together leading experts across Europe to enable capacity and skills development within the Heat Pump sector and to ensure that the energy efficiency gains afforded by heat pumps are realised. HP4All, following a holistic, systemic point of view, will work both with the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.). This way, the project will enhance, develop, and promote the skills required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings bringing Europe to the forefront of the climatization sector. With the drafting of a competency framework, based on research, data gathering, collaboration with other projects, organising of events, stakeholder interviews and a process of constant feedback and updating being the corner stone towards achieving the HP4All objectives. The competency framework still requires real world testing and validation, this comes after it becomes public, while parts of it have already been endorsed by dozens of stakeholders that have contributed to the data gathering via interviews, surveys, events and meetings, the framework has only been conceptualised.

This document is the HP4ALL HP Skills and Competency Framework (Grant Agreement no.891775).

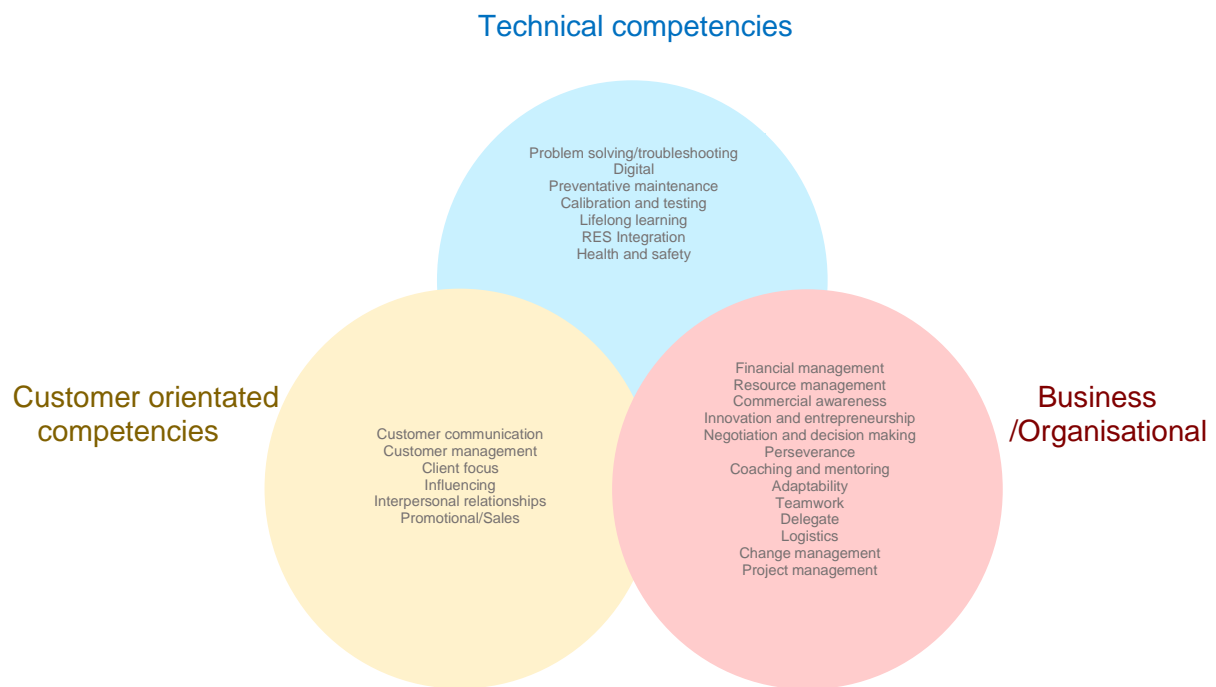
The document is especially relevant due to recent health and geopolitical factors, that have added extra strains on the heat pump value chain and labour market in general. The requirements and competencies of heat pump installers and designers are different for each region and so to illustrate this the competencies of heat pump designers and installers from the pilot regions is shown below:

<i>Pilot:</i>	<i>Ireland</i>	<i>Spain</i>	<i>Austria</i>
Heat Pump Designer	<ul style="list-style-type: none"> Heat Pump Fundamentals – Refrigeration Cycle, components, building standards, performance of heat pumps. Design aspects – Location selection for indoor and outdoor units, heat loss assessment of a building, site constraints. Design criteria – for hot water and heating systems, heat requirement and output. Understanding and producing electrical and mechanical schematics Commissioning – System flushing, cleaning, filling, and venting, balancing flows on radiators/underfloor, 	Competence description (official; ECVET level 3): Develop projects of heating installations, determining their characteristics, preparing the plans, planning, and specifying the assembly and test protocols, from a preliminary project and according to the technical specifications, standards, and established procedures, ensuring the viability of the project, quality, safety, and respect for the environment of these facilities.	The specification, design, and installation of heat pump systems are typically carried out by the same professionals. Heating installer is a skilled trade called "Installation and building technicians" (Installations- und GebäudetechnikerIn). Installation and building technicians plan, assemble, set up, maintain, and repair heating and domestic hot water systems and their components.



	<p>heating compensation curve settings adjustment.</p> <ul style="list-style-type: none"> Handover – Benefits of heat pumps, feasibility of heat pumps, control strategies and showcasing. 		
Heat Pump Installer	<p>Practical training on the system installation</p> <ul style="list-style-type: none"> Pipework type, insulation, jointing & cutting method. Installation requirements – Manufacturer requirements and regulation requirements Selection and installation of room thermostats Safety regulations 	<p>Competence description (official; ECVET level 2): Carry out the assembly, maintenance and repair operations of heat production facilities and their transmission by fluids, in accordance with the processes and assembly and maintenance plans, with the required quality, complying with current regulations and regulations, in conditions of personal and environmental safety.</p>	
Ground source Heat Pump Installer	<p>For Ground Source heat pumps installers and designers in addition to above, competencies are the same as a plumber and engineers, but there is extra training on:</p> <ol style="list-style-type: none"> handling of glycol, fusion welding, and purging air from brine ground loops 	<p>Competence description (official; ECVET level 2): Assembling and commissioning in-circuit geothermal exchange facilities with closed collection (zero circuit comprising exchangers, vertical, or horizontal, inclined, and driving to the engine room) and engine room, carrying out the maintenance, compliance, environmental protection, planning of preventive activity, quality standards, safety of geothermal exchange facilities and handling of heat transfer fluids.</p>	<p>In addition to above, there are voluntary and certified training programmes that cover ground source heat pumps in more detail, such as the multi-day training course to become a certified heat pump planner and installer (offered in Upper Austria by ESV together with AIT and Wärmepumpe Austria)</p>
Electrical Connections	<p>Electrical connections need to be installed and commissioned by a registered Electrician. Register can be found at SafeElectric.ie</p>	<p>Electrical connections need to be installed and commissioned by a registered Electrician / electric power installer</p>	<p>Electrical connections need to be installed and commissioned by a qualified electrician.</p>
F-Gas Connections	<p>For Split systems, an F-gas engineer is required to connect the outdoor unit and the indoor unit, charge, refill, maintain and certify the refrigerant system.</p>	<p>A registered F-gas engineer / installer professional/ company is required to connect the outdoor unit and the indoor unit, charge, refill, maintain and certify the refrigerant system.</p>	<p>Certification is required for handling refrigerants according to Austrian and EU legislation and standardisation. A trained heating installer, for example, needs an additional exam on specific aspects of handling refrigerants to get the official certification.</p>

Additionally, the analysis has shown that the competencies needed go beyond the purely technical ones, having a wider scope, that can be seen in the graph below:



2 Acronyms and abbreviations

ADEME	L'Agence de l'Environnement et de la Maîtrise de l'Energie
AIT	Austrian Institute of Technology
ALOS	Achieved Learning Outcomes
AT	Austria
BDI	Virtual Desktop Solutions
BIM	Building Information Modelling
BIMEET	BIM-based EU -wide Standardized Qualification Framework for achieving Energy Efficiency Training
BUSLEAGUE	Dedicated to stimulating demand for sustainable energy skills in the construction sector
BWP	Bundesverband Wärmepumpe
CEDEFOP	The European Centre for the Development of Vocational Training
CRAFTEDU	Setting up national qualification and training scheme for craftsmen in the Czech Republic and developing the further offer of training courses in Slovakia, Austria and Bulgaria
CRU	Commission for Regulation of Utilities
CTA	Technological Corporation of Andalusia
D (E.G. D3.1.2.)	Deliverable
DASBE	Digital Academy for Sustainable Built Environment
DG	Directorate-General

DKIT	Dundalk Institute of Technology
EC	European Commission
ECAC	The ECAC Training provider (ecac.ie)
EDC	European Development Center
EE	Energy Efficiency
EEA	European Education Area
EEFFG	The Austrian Energy Efficiency Act (Bundes-Energieeffizienzgesetz)
EHPA	European Heat Pump Association
EQF	European Qualifications Framework
ERASMUS	European Region Action Scheme for the Mobility of University Students
ES	Spain
ESIF	European Structural and Investment Funds
ESR	European Skills Registry
ETB	Education and Training Board/s
EU	European Union
EUCERT	European Union Certification
F-GAS	Fluorinated Gas/s
FETAC	Further Education and Training Awards Council
FTE	Full Time Equivalent/s

GHG	Green House Gas/s
HLI	Heat Loss Indicator
HP/S	Heat Pump/s
HR	Human Resources
HTL	HÖHERE TECHNISCHE LEHRANSTALT
HVAC	Heating and Air Conditioning
IAEA	International Atomic Energy Agency
IE	Ireland
IERC	International Energy Research Centre
ILOS	Intended Learning Outcomes
INSTRUCT	Evidence-based market and policy instruments Implementation across EU to increase the demand for eEnergy Skills across conSTRUCTION sector value chain
IOT	Internet of Things
LIT	Limerick Institute of Technology
M (E.G. M12)	Month
MEP	Mechanical, Electrical and Plumbing
METAC	The METAC Training provider (metac.ie)
MHU	Mobile Home Unit/s
MIS	Management Information System

MS	Microsoft
NECP	The National Energy and Climate Plan
NZEB/NZEB	Net Zero Energy Building
OECD	Organisation for Economic Co-operation and Development
PE	Performance
QC	Qualified Certifier
QF	Qualification Framework
QQI	Quality and Qualifications Ireland
R&D	Research and Development
REC	Registered Electrical Contractor
RED	Renewable Energy Directive
RES	Renewable Energy Sources
RGE	Recognized as a guarantee for the environment
RINA-C	RINA Consulting
ROI	Return On Investment
SEAI	<u>Sustainable Energy Authority Of Ireland</u>
SHRM	Society for Human Resource Management
SME	Small to Medium Enterprise/s
T (E.G. T3.1.)	Task

TRAIN4SUSTAIN	Establishing Future-Oriented Training and Qualification Quality Standards for Fostering a Broad Uptake of Sustainable Energy Skills in the European Construction Sector
ULOS	Units of Learning Outcomes
VAT	Value Added Tax
VET	Vocational Education and Training
WP	Work Package
WWETB	Waterford and Wexford Education and Training Board



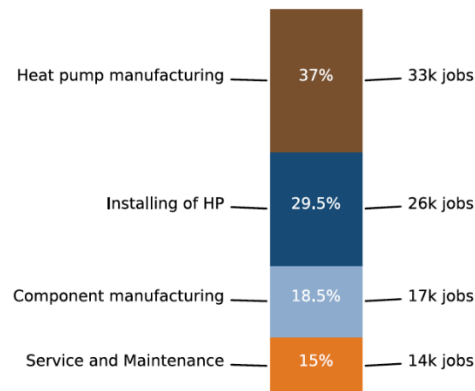
3 Introduction

This document is the HP4ALL HP Skills and Competency Framework (contract no.891775) corresponding to D3.3.2 (M28) lead by EHPA. This document contains all relevant information regarding the HP Skills and Competency Framework, building upon the Draft being prepared as part of D3.3.1 (HP Skills and Competency Framework Draft) prepared in M12. It draws initial inspiration from other projects in the field (EU funded projects under Horizon 2020 e.g. BUSLeague¹), other previous deliverables and data gathering of HP4All (T2.3.; T3.1.; T3.2.; T4.1.), Competency Frameworks that are used in other organisations/sectors (e.g. the OECD) and data gathering mechanisms such as interviews and panel discussions during EHPA organised events. Building upon the 16-month process from the completion of the draft structure, as well as the large data gathering (from research, likeminded project collaboration, expert inputs and other), it serves as a starting point for discussion, validation and as an instrument for gathering relevant stakeholder feedback. With the process, data gathering, instruments and stakeholders involved being described below, all leading to the relevant Competency Framework and suggestions for the next steps meant to use it at its full potential, as well as the process of updating it based on changing parameters.

This is especially relevant given the recent push towards the mass deployment of HPs and the employment and economic benefits that are already created inside the EU by the industry, as the European manufactures of heat pumps and components are world leaders in this technology. As the EHPA Market Report (2021), showcasing that manufacturers are now offering integrated solutions equipped with interfaces, thus providing ever-increased efficiency catering to nearly all application fields. Based on the average sales prices of the different systems, the total value of the 2020 market volume is almost 10.98 billion (incl. VAT). Based on the different average costs per system, the turnover shares per type split up as follows: Heating-only air/water heat pumps represent 36%, reversible air/air with heating function 27% and heating-only ground/water systems 16% of total turnover. The rest is comprised of reversible air/water (15%), sanitary hot water heat pumps (5%) and exhaust air (1%). Based on the national VAT rates, this indicates total VAT generated by heat pump sales of approx. 1.77 billion Euros.

From a labour perspective, the heat pump sector employs a well-educated work force in the areas of R&D, components and heat pump manufacturing, installers (including drillers) and service & maintenance. Based on the number of working hours needed to install the different types of heat pumps and based on expert estimates on turn-over per employee, the total number of employees in the European heat pump industry is estimated 89.784 persons, approx. 37% of these being active in heat pump manufacturing.

¹ BUSLeague is an international project co-funded by the European Union's Horizon 2020 framework programme for research and innovation (LC-SC3-2018-2019-2020 – Building a Low-Carbon, Climate Resilient Future: Secure, Clean, and Efficient Energy) under grant agreement No. 892894.



European legislators have regulated many aspects of heat pump development and market development on the component, unit and systems level. In summer 2011, heat pumps have entered the conceptual debate with the first announcement of the heating and cooling strategy, broadened even further by the announcement of the Europe's energy transition. EHPA is convinced that without heat pumps both endeavours will be impossible to tackle. Heat pump technology has benefits reducing energy demand, benefiting the environment and helping to create a resilient energy system based on renewable energy and resulting in a large number of local jobs.



4 Process, data gathering, instruments and stakeholders.

4.1. Input from other project deliverables

Though all relevant project resources will be employed in designing and gathering data that can be used for the Competency Framework, with the project partners, Observer / Leader Regions, events and research all coming together, of particular interest and already considered since the inception of the project proposal, are a set of deliverables that while achieving their purpose, can also build and act as data gathering instruments for D3.3.2. Of these, a particular attention will be given and indeed designed into T2.3.; T3.1.; T3.2. and T4.1.

4.1.1. The Heat Pump Experts – Survey of Skill Needs & Opportunities (T2.3.)

already offered the possibility of engaging directly with Heat Pump experts and gathering their feedback, with its conclusions being considered and employed in the drafting and argumentation of the Competency Framework. The task was meant to understand the status of the HP market from the point of view of those currently working in it, including the drivers and barriers that could stimulate or restrict the demand for skills in the European construction sector specifically related to HP system design, installation, commissioning, and ongoing maintenance. To establish this baseline position, a survey was carried out with the panel of HP experts developed in Task 2.2. IERC (with inputs from the other partners) developing a survey template (by M3) to enable comparison of the results. With LIT, CTA, ESV carrying out the survey and sharing it with participants of the three respective pilot Expert Groups to gather insights into the barriers that are preventing upskilling of the workforce and HP roll out around Europe. Additionally, EHPA conducted a review with its members for their inputs and so as to also include the full EU perspective. To ensure maximum participation, the survey was translated and adapted from English into Spanish and German for use in each pilot country. The list of suitable HP Experts was agreed by the consortium in M4. To supplement the results of the survey, each country partner (LIT, CTA, ESV) also ran one focus group event in their country in the first year of the project, with 5-10 relevant stakeholders willing to share their experiences and speak in more detail about their observations. IERC, in collaboration with the project team, developed a standard focus group workshop format to be used in each country, enabling standardisation and comparison of the data gathered in the different countries. The outputs from each country were collated into a report by IERC (D2.3). This deliverable, when combined with D2.1 and D4.1 from WP4 on End User Demands, providing a comprehensive overview of the supply and demand considerations of HP skills at an EU and Member-state level.

With the main findings of the work, selected below.

The specific actions that will have the most impact on boosting the HP market in each of the pilot regions will differ from each other since each country's market is at a different level of maturity and exists within its own policy framework.

Actions for the increase of skills and competences all over the value chain should be taken for the development of the HP market, mainly focusing on the upskilling of



installers and designers who might or might not be part of the HP industry. To stimulate the development of the HP market, those actions need a supportive policy framework that encourages the transition towards the use of renewable energy sources via, for example, taxation of CO₂, and a regulation of the built environment, for instance, banning fossil fuels in new buildings.

Financial incentives can also play a major role in the development of the HP market, as they are a key enabler for overcoming challenges such as the high cost of a heat pump installation and the high cost of electricity compared to the cost of fossil-fuel-powered systems like gas boilers. Working on raising awareness and making information available to all supply chain actors is considered of critical importance for the development of the HP market, particularly among end-users of HPs. Actions directed at raising awareness should become a priority to overcome the end-user's resistance to new technologies and encourage the demand for a transition away from fossil fuel-based systems.

Detailed information extracted from survey:

Main driver in the heat pump market identified in the survey:

- Having a supportive policy framework.

Main barriers in the HP market identified in the survey:

- High cost of installation (identified in Spain, Austria)
 1. Austria: low level of maturity of the market - low levels of awareness of economically feasible application possibilities among planners and users.
 2. Spain: cost is a decisive factor in the implementation of HPs in buildings. Low consumer awareness prevalent among installers of HPS in non-residential frameworks. Consumers unaware of main advantages of HPs.
- Lack of qualified and experienced planners, designers, and installers. (Identified in

Ireland, European level).

1. Ireland: The sector lacks a standardised approach to the design and installation of domestic HP systems.
2. There was concern among the experts who attended the focus group that poor quality work would lead to underperforming systems which could ultimately damage the reputation of HPs and hinder growth in the market.

Policies & Initiatives needed to drive the HP Market identified in the survey:

- Increase skills across the value chain ("Those working in HP planning, design, distribution, installation and maintenance should be the main target of any upskilling initiatives").
- Increase End-user awareness of HPs.
- Implementation of regulations requiring the transition from fossils fuels to renewables.

Ireland: need for policymakers to better communicate with the market, allowing experiences from the marketplace to play a role in developing policy going further.

1. Ensuring that new standards for HPs are properly implemented.
2. Ensuring that installers are properly trained and that assessments of installations are carried out to check for quality and feedback any issues to the installer so that they can be corrected.



3. Providing more training and information to consultancy firms that design heating systems to ensure that they are correctly designed and specified when they integrate HPs.
4. Increasing the level of monitoring of HP installations so that effective measurement and verification of their performance can be carried out.
5. Addressing the lack of knowledge among the general population on the basics of heat pumps and their potential benefits. Not every building is immediately suitable for a heat pump, but all buildings that are suitable for heat pumps should be targeted by advertising and other awareness campaigns.

Austria: low levels of awareness of promising and economically feasible application possibilities among planners and users, and the lack of required skills by planners and installers.

1. It is important to adopt a holistic approach and consider all actors along the value chain. HPs have interfaces to many areas of expertise. It is necessary to close these interfaces with knowledge.
2. There is a large need for communication tools targeted to specific actor groups: case studies, best practices, information brochures, HP checklist for companies, information on planners and suppliers etc.
3. More technical information on which HPs are already available as standard solutions for which application areas would be helpful. Experts seem to have different levels of knowledge about this.

Spain: Improved specification of the existing regulations that require the transition away from fossil fuels will bring greater clarity to the sector and accelerate the growth of the HP market. Additionally, it is important to simplify the rules around the administration of government incentives, especially in residential buildings to encourage uptake.

1. It is urgent to standardise and clarify the regulations at sectoral, regional, and state level to avoid misinterpretation and misunderstanding of the rules. The clarification of regulations will allow a much faster development of the HP market in Spain.
2. Raising awareness among manufacturers and installers of the shared use of air conditioning and heating systems to enable them to take advantage of the greater efficiencies that can be achieved through combined systems.

EU: the need for subsidies to promote the use of renewables and renovation and the increasing taxes on CO2 emissions.

1. Focus on introducing HP technologies in the training and upskilling of installers and designers.
2. Focus on building installation technicians and end-user competencies to properly choose, install, and manage HPs.
3. Ensure it is possible for knowledge and know-how to be transferred from the HP industry to the fossil fuels industry.
4. Consider innovation in terms of HP interface to simplify the HP operation and installation process.
5. Combine skills development with robust standards which are actively policed and enforced.

4.1.2. The Training Providers Survey (T3.1.)

The Training Providers Survey was built around a competency framework structure, complemented with a look into past, current, and future practices as to temporally adapt our framework and not include any skills/competencies that the training providers (in their experience) consider to be less important in the current and future environment. Indeed, the structure being based on a competency framework of four separate stages. The first one is defining the purpose of the framework (To facilitate the mass deployment of Heat Pumps and the upskilling of workers to transition from installing fossil fuel boilers to installing Heat Pumps) and then assemble a team (in this case the project partners) that has a holistic view of the sector. The second step was to collect information (e.g., surveys, interviews) from the relevant stakeholders. After the information was collected, being analysed, and validated, with the final step, being its implementation and potential adaptation to diverse National and European requirements.

Keeping the theme of using the surveys/interviews to inform the next deliverable (draft competency framework, the questions followed a set of blocks (each made of a set of skills that professionals in the HP field should have:

1. Technical competencies
 - a) Problem solving/troubleshooting
 - b) Digital
 - c) Preventative maintenance
 - d) Calibration and testing (rigour and accuracy)
 - e) Continuous improvement (lifelong learning)
 - f) Renewable Energy Systems Integration
2. Customer orientated competencies
 - a) Customer communication and management
 - b) Client focus
 - c) Influencing
 - d) Interpersonal relationships
 - e) Promotional/Sales
3. Business competencies
 - a) Financial Management
 - b) Efficient organisation of resources
 - c) Commercial awareness (how the company works)
 - d) Innovation and entrepreneurship
 - e) Negotiation and decision making
 - f) Perseverance (result driven)
4. Organisational competencies
 - a) Coaching and mentoring
 - b) Adaptability
 - c) Teamwork
 - d) Delegate
 - e) Logistics
 - f) Change management
 - g) Project management
5. Health and safety
 - a) Local building codes and safety regulations
 - b) Safety procedures and standards (in case of HVAC equipment failure; equipment replacement)



While keeping in mind the minimum requirements (if such requirements exist) present in each region/country, for the installation of a Heat Pump (in addition to the training provided by manufacturers), for residential and non-residential buildings.

With the main findings of the work, selected below.

1. Minimum qualifications/competencies in the HP sector:

Not all surveyed regions (Ireland, Upper Austria, Spain, Italy) have specific qualifications/competence necessary for installation of heat pumps, but all regions highlighted the importance of requirements and competences regarding F-gas (F-Gas Regulation 517/2014² art 10 indicates that Member States need to ensure that training programmes for recovering F-Gas are available. Those certification programmes and training provided need to cover applicable regulations and technical standards, emission prevention, recovery of F-gas, safe handling of the equipment and information of relevant technologies to replace or reduce the use of F-gas).

2. Skills/knowledge/competencies and associated Learning Outcomes

a) Training delivery

Preferred learning methods highlighted – validated by past experiences and the motivation on the training participants: Lectures, hands on training and case studies. Exacerbation of the use of the e-learning by Covid19. It is pointed out that importance of developing new virtual facilities to integrate heat pump training with other renewable energy system.

Detailed data extracted from survey:

Ireland: Now: online/live lectures and instructor led training.

- DKIT and METAC training: 10 weeks course called “Heat Pump installer” – 60% online/ 40% on-site. (Trainees satisfied with the dual approach: reduces travel time)
- Grant engineering & ECAC: HP training trolleys as well as courses on air tightness, NZEB and deep retrofit)- on-site training. Hands on practical training to provide trainees a holistic overview of the overall heating system.

Italy: Now: E-learning, case studies, instructor-led training. Others: practice training, certification exams according to national standard. Methods chosen to transmit info quickly and efficiently, they have been validated by past experiences and because they have stimulated the motivation of training participants.

Spain: Now: e-learning, hands on training, live/virtual training, case studies, coaching/mentoring. In the future: coaching/mentoring and lectures. It would be interesting to develop new virtual facilities (hp installations, system demonstrations)

Upper Austria: interest in heat pumps increased over the last years.

Europe Wide: Now: Live/virtual lectures, hands on training, e-learning, instructor led-training. In the future: new virtual facilities to integrate heat pump training with other renewable energy systems trainings or to develop new on-line training capabilities and curriculum.

b) Technical Competencies

² Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 Text with EEA relevance: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014R0517&qid=1608306002561>



The technical competencies considered in trainings are determined mainly by the how they reflect the Market demand, by how necessary they are by professional recognition and how they respect customers' requests. **All proposed technical competencies in the survey have been, are and will be considered in the trainings of all the regions in a higher or lower level** (problem solving/troubleshooting, renewable energy systems integration, heat pump systems that include smart (IoT) components, heat pump systems interfaces (user/installer interface), preventative maintenance/diagnostics, calibration and testing (rigor and accuracy), performance analysis and system optimization, continuous technical skills improvement). **Technical competencies such as preventative maintenance/diagnostics, Heat Pump Systems that include smart (IoT) components and Continuous technical skill improvement are considered to increase their already high relevance in the next 5 years.**

Detailed data extracted from survey:

Ireland:

- DKIT and METAC training: training on fundamentals of heat pump design – that is the highest competency with regards to heat pumps-
- Grant engineering & ECAC:
 - o Grant: specific to manufacturers of heat pumps – does not touch on the understanding of HPs or design, sizing, or commissioning of units.
 - o ECAC: focused on refrigeration section of heat pumps.

Italy: additional competencies highlighted: economics and fiscal competencies, digital competencies, circular economy approach, renewable energy systems proper installation and commission.

Upper Austria: training takes places in a “dual system” of vocational schools and on-the-job training in the heating installation companies. Training is very hands-on oriented. They learn theory in school and practice training in the company in which they are employed.

- HP manufacturers: offer training programs for installers on HP installation, commissioning, and customer service.
- AIT: technical training for HP installers/planners: technical aspects of planning and installing HP systems at their heat source. Specific training on refrigeration engineering and flammable refrigerants.
- Energy advisers' courses.
- ESV-energy academy: energy efficiency and renewable energy, specialized courses on HP technologies (technology innovations, cost-efficient planning, financing, available subsidies, implementation of energy solutions).

c) Customer oriented competencies

The Customer Oriented Competencies considered in trainings are determined mainly, in a higher or lesser extent, by how they improve the customer satisfaction with their product/s or services, how they respect the customers' requests and how they improve the market demand.

Competencies such as Customer Communication, Customer management and interpersonal relationships are currently considered in trainings.

Detailed data extracted from survey:

Ireland: customer communication, client focus, building interpersonal relationship

- DKIT and METAC training: dealing with homeowner, hand over documents and control guides to the homeowner, cost and comparisons of different fuels and different heat sources.



Italy: Now: Customer management, customer communications, interpersonal relationships. Others: knowledge of environmental topics and a greener approach.

Spain: Now: Customer management, promotion/sales and positive influence (based on previous experience) In the future: customer communication and customer orientation

Upper Austria: Apprentices learn customer-oriented competencies throughout their practical training.

- AIT: social competences linked to sales of HP and advice services.
- Energy advisors' courses include communication competencies to sound knowledgeable and inspire trust from clients.

EU wide: Now: customer communication, positive influencing, interpersonal relationships, customer management. It is highlighted Customer training as an informed customer on settings inputted can play a big role in the operation of any device.

d) Business Competencies

The business competencies considered in trainings are determined mainly by how they can improve the sales and meet the market's demand. The elements considered important to be taught vary depending on the region: **efficient organization and use of resources and commercial awareness, however, are considered crucial as of today in most of the regions.**

Detailed data extracted from survey:

Ireland: training has elements of commercial awareness, negotiation and decision making.

- DKIT and METAC training: project management, teamwork, adaptability and aware of delegation between the 3 trades of the heat pump (electrical, refrigeration and plumbing)

Italy: Now: efficient organization and use of resources, commercial awareness, innovation and entrepreneurship, perseverance (result driven). Others: incentives, subsidiaries, ROI and break-even point, white certificate trading, waste management.

Spain: Now: efficient use of resources, commercial awareness, and perseverance. In the future: innovation and entrepreneurship, negotiation and decision making.

Upper Austria: As an extension of the dual vocational training HP installers can continue their training to become a "master craftsman" (professional advancement and enables them in becoming a business manager/owner).

- AIT: non-technical training on HP sales. Targeting installers and covering a range of business topics, this way increasing installer's sales competencies.
- ESV's Energy Academy: trainings on the financial aspects of project implementation, subsidies and on increasing competitiveness with energy efficiency.

Europe Wide: Now: efficient organization and use of resources, negotiation and decision making, perseverance.

e) Organisational Competencies

While it is important to remark that in some regions, such as Upper Austria, organizational competencies are not the focus for some of the main HP training providers, in the other surveyed regions, said competencies are indeed considered during training. Mostly determined by how they can improve customer satisfaction and meet the market demand. There is not a consensus among regions regarding which are the most important competencies to be taught nor regarding the future trends since every region might need to overcome



different challenges. **However, competencies such as teamwork, delegation, logistics and even adaptability are highlighted by the participants of almost all surveyed regions.**

Detailed data extracted from survey:

Ireland: Now: Delegate, logistics.

Italy: Now: adaptability, delegate, teamwork, project management. Others: cross related competences to reach more “agile” organizations.

Spain: Now: project management, teamwork, delegation, and logistics. In the future: coaching and mentoring and change management.

Upper Austria: apprentices learn organizational competencies throughout their practical training.

Europe Wide: Now: adaptability, teamwork, project management. Others: long term visions planning

f) Health and safety competencies

In all surveyed regions, Health and Safety competencies are considered a crucial element in the heat pump training. Whether they are considered to reflect market demand or to improve customer satisfaction, competences such as **Safety procedures and standards (in case of HVAC equipment failure) and Safety procedures and standards (in case of equipment replacement/upgrading) are highlighted as crucial competencies today.** In the next 5 years, most of the surveyed regions pointed out the importance of teaching **European building codes and safety regulations.**

Detailed data extracted from survey:

Ireland: now: National building codes, safety regulations, safety procedures and standards.

- DKIT and METAC training: health and safety are another module building from HP training.
- Grant engineering & ECAC: health and safety are another module building from HP training.

Italy: Now: Safety procedures and standards (in case of HVAC equipment failure), safety procedures and standards (in case of equipment replacement/upgrading), National building codes and safety regulations. Others: importance of performing a risk assessment in case of installation of complex systems and the urgency to implement new refrigerant A2 and A3 safety related standard and training/certification programme.

Spain: Now: local, national and European Building regulations and safety standards as well as safety procedures and standards. In the future: European building codes and safety standards

Upper Austria: Health and safety are a key element of HP training. Local/national building codes and safety regulations are core topics in the training of HP installers. Ensure safety and security for HP installers and end-users.

Europe Wide: Now: safety procedures and standards (in case of equipment replacement/upgrading), safety procedures and standards (in case of HVAC equipment failure), national building codes and safety regulations. Global compliance to local standards was added as a response.

3. Foreseen training curriculum in HP technology, installation, and maintenance

The importance of working on the qualification of heat pump installers was highlighted,

as well as the comprehensive approach for training all along the HP Value chain as HPs



have interfaces in many areas of expertise. Regarding the ways in which said training could be delivered new virtual facilities, tools and videos and webinars for different targets (installers, designers...) were pointed out.

Detailed info extracted from survey:

Ireland: during the discussions, several opportunities for HP4ALL were identified.

- Time-Served Tradespeople: HP4ALL can help the time-served tradespeople an avenue to the HP market by offering a way for people to apply for competency in their work. An outreach program between SEAI, Manufacturers, and training facilities to help boost capacity.
- Increasing Homeowner training and resources: High quality Home-owner guides and hand over materials can have a positive impact on efficiency of units and customer happiness. HP4ALL could work with manufacturers and training providers to create high quality homeowner guides.
- Register and Installer Pathway: SEAI have a register of approved installers that can apply for SEAI grants. Another list should be made of installers out there with high competency but without the specific qualifications. This register would identify installers, forward the installers to training providers and connect them with SEAI to be added to the grant register.
- Troubleshoot guide: Bite size online material is being utilised by training providers like Toolbox talks and series of online videos for installers to increase common knowledge and solutions to problems.
- HP roadshow: Practical HP Resource is being used for training called a HP training trolley, this idea of a mobile training centre could be utilised to bring training to work rather than installers leaving work to do training.

Italy: several points of view have been collected in the Italian Survey:

- Planning webinars for different targets (installers, designers, service)
- Improving technical seminars / training centre / find new ways to communicate
- Preparing and maintaining updated tech and promotional team
- Using marketing and communication tools as promotional and advertising
- Developing new web tools, case history, references, and videos
- Advocacy actions to influence local regulation and standard under revision and new ones

Spain: develop new virtual facilities (heat pump installations, system demonstrations, etc.). develop new online training capabilities and curriculum instead, as well integrating heat pump training with other training and renewable energy systems.

Upper Austria: Regarding which measures should organisations take in the future for the potential influx of training demand, several points of view have been collected during the Austrian interviews:

- It is important to adopt a comprehensive approach for training and consider all actors along the HP value chain. HPs have interfaces to many areas of expertise. It is necessary to close these interfaces with knowledge.
- The importance of training and further education for planners and installers needs further recognition by professionals and their employers. Campaigns and programmes offering financial support to the companies would be beneficial in encouraging them to offer further training opportunities to their staff.
- It would help if the title "certified HP planner and installer" were more strongly recognised on the market and requested by end-users. Companies would have a



stronger incentive in sending their employees to be certified if it offered them a competitive advantage on the market. More certified professionals would lead to increasing the overall level of knowledge and competence on the market and ensure higher quality and performance of HP installations. The AIT and Austrian Heat Pump Association are putting efforts on this.

- In Upper Austria, large-scale HPs for industry have a good technical potential. At this early market development stage, training along the entire value chain (from professionals to end-users) is needed and would contribute to increasing awareness, generating end-user trust, creating both market push and demand and ensuring high-quality planning and implementation of projects.

Europe Wide:

- There should be a licensed system for heat pumps installed by qualified engineers.
- All incentives must create action towards climate protection, not to just "selling or installing something"

4. Opportunities, gaps, and barriers preventing upskilling and/or continuous learning

Overall, in all surveyed regions, one of the main barriers identified by the training providers to be preventing the upskilling/continuous learning was a **high resistance to change within the heat pump industry (e.g adapting to new technical advancements)**. Other elements such as **Limited Resources (timewise, financially wise, and personnel wise)** were pointed out as having a deep impact on the HP training delivered.

It was also remarked that communication tools targeted to specific group actors, as well as **time-efficient training programmes should be adapted to the busy schedule of companies but deliver the necessary knowledge for carrying out their activities all along**

the value chain.

Detailed data extracted from survey:

Ireland: From this survey and from structured interviews, several challenges were identified for HP4ALL:

- One for All: HP manufacturer training is sometimes being done by one member of a company just to get the certification to install the specific HP for their company allowing to others in the company to install HP without the proper training. The commissioning of the installation can identify the competency of the installer but by this stage it is too late to rectify the damage.
- Grant Scheme: From conversations with installers, designers and contractors, and trainers most heat pump installations are not grant funded as the grant process is seen as too cumbersome, the requirements for declaration of works are seen as too much.
- Isolating Time-served Tradespeople: Not all tradespeople in the market have level 6 qualifications, some are time-served. These people should not be isolated from the market due to strict guidelines on education. Time-served tradespeople have the skills to carry out installations, but they do not have the correct education requirements. There are cases where a time-served tradesperson sends their apprentice to receive heat pump training.
- Hand Holding and Monopoly: Manufacturers and re-sellers are providing all the designing, planning, sizing, and commissioning as services to the installer that completes their training. This reduces the capacity of the market to grow and unfairly



monopolises the roles of designer and commissioning person with manufacturers and re-sellers.

- 3-Trades Trichotomy: One of the key issues identified from conversations with experts, trainers and manufacturers is that the HP installation brings together 3 trades to install one unit, electrical, refrigeration and plumbing. The relations between these trades can have a huge effect on HP efficiency, if the 3 trades are not working together and conversing often, issues may arise.

Italy: Main barriers now: non-learning culture, resistance to change, lack of leadership, limited resources. Others: lack of contact points between schools (high schools and uni) and the workplaces

Spain: Now: limited resources, lack of leadership. **In the future:** programme approach versus the organisation's approach is expected to become the main barrier.

Upper Austria: Sometimes, there is a wrong perception that "anyone who can install an oil boiler can install a HP".

- Installation companies are extremely busy and suffer from a lack of finding suitable apprentices and qualified staff. Therefore, training programmes have to be extremely time efficient. This is a challenge given the increasing complexity of modern equipment. Also, there are many exceedingly small, 1–2-person installation companies. For them, finding time for training is even more difficult as they spend most of their work hours on construction sites.
- There is a large need for communication tools targeted to specific actor groups: case studies, best practices, information brochures, HP checklist for companies, information on planners and suppliers etc.

Europe wide: Now: work-learning dichotomy, limited resources, non-learning culture, resistance to change. Other: advanced process control logic, language barriers, cultural gaps,

fear of investing in employees that can leave the company.

4.1.3. National and European Union Prospective Training Frameworks (T3.2.)

The work undertook an analysis of the upcoming European and National upskill policies, being assessed as follows:

- EU regulations in this matter – planned implementation frameworks of directives that aim to improve and homogenise this sector on an EU level. This was conducted by EHPA and RINA.
- National and Regional prospective frameworks in IE, ES, AT to see an overview on the future regulations and the potential impact, comparing them with the strengths and weaknesses of the current market along with the extra skills and competences that are needed to optimize the results in nZEB-construction and renovation projects. (LIT, CTA and ESV completed this review).
- Use of best practice examples that can be replicated in upskilling building professionals and/or blue-collar workers across the building design, operation, and maintenance value chain. IERC conducted this analysis.

This analysis drawing on relevant education, training, energy policies and directives thus considering the potential for mutual recognition of skills and competencies, as well as potential challenges in meeting the supply of the upskilling provision. EHPA compiling this data into D3.2.



With the main findings of the work, selected below.

Need for careful planning to prevent a skills shortage in the future, to ensure that workers have the relevant skills for the climate transition, as well as to prepare the work force for any unforeseen events. **Adequate funding is the key to underpinning the success of many of these initiatives.**

European Legislation

The EU are putting a stronger focus on future-proofing their workforce by an emphasis on re- and up-skilling workers to be able to cope with the green and digital transitions. **Additionally, encouraging investment in skills and training through the public sector loans facility is important as it allows those who would not otherwise be able to, to access vital funding.** The most important conclusion to be drawn from the European perspective is the element of **sharing best practice/s with other countries and collaborating in order to ensure that training programmes are the best they can be in all European Member States.**

Detailed information from initiatives analysed:

- **Climate law:** addressing the climate transition's impact on society, in particular 'vulnerable communities' and giving them the skills to adapt. This particularly affects those sectors and workers impacted by climate neutrality ambitions, such as those in fossil fuel industries.
- **European Skills agenda for sustainable competitiveness, social fairness, and resilience:** 5-year plan, with adequate funding (85 million EUR). Those with low qualifications and those who are seeking employment will benefit from the financial support and long-term planning provided by this strategy, as one of its aims is to help adults undertake training to increase their skills so that they are better able to cope with the green and digital transitions.
- **Public sector loan facility:** support areas which have been negatively affected by the climate transition and direct public investment through preferential lending conditions. This regulation should increase the uptake in reskilling initiatives, as more financial assistance will be available and training programs will become more accessible. **This example highlights the need for adequate funding if governments/authorities wish for success in reskilling for the green transition.**
- **Renovation Wave:** The Renovation Wave particularly targets those in the EU building industry who either already have skills in building renovation, or who are well placed to develop them.
- **The European Education Area:** support member states in building 'resilient and forward-looking education and training plans. Emphasis is placed on structural barriers to learning, skills and development, in order to prevent these having a negative effect on employment opportunities. The EEA covers six dimensions: quality, inclusion and gender equality, green and digital transitions, teachers and trainers, higher education, and geopolitical dimensions.
- **The next ERASMUS+ programme** (ERASMUS program for education, training, youth, and sport 2021- 2027) aims to support learning mobility opportunities and cooperation between stakeholders. There will be a focus on people from all social backgrounds acquiring new skills in 'future orientated areas such as climate change and clean energy



- **The Proposal for a Council Recommendation on Vocational education and training (VET) for sustainable competitiveness, social fairness and resilience** defines the key principles that ensure vocational education and training is adapted to the changing needs of the labor market. The proposal places a strong focus on the increased flexibility of vocational education and training and reinforces opportunities for work-based learning and apprenticeships, as well as improved quality reassurance.
- **RGE quality label (FRANCE):** qualification scheme. It aims at encouraging installers and operators to increase their competences. Platforms for training professionals are organized at the regional level with the support of ADEME. Information website managed by ADEME helps consumers choose the right professional for their renovation works since ADEME publishes national list of RGE professionals on their website. Other tools to assist professionals are developed, such as publicly and freely available technical guidebooks emphasising quality issues, free training courses available online (e-learning), networks of actors created to promote experience sharing and the dissemination of information. Many European countries do not yet have such tools, while France represents a successful example.

National and Regional Prospective Frameworks

It can be concluded that these countries (Austria, Ireland, and Spain) are taking steps in order to decarbonise, that increases the need to develop the whole workforce skills in order to combat this problem. **High quality training, which is accessible to all professionals, as well as on-the-job learning such as apprenticeships are vital to the future of the workforce. Policies such as increased renovation are important as they contribute to decarbonisation goals whilst also providing increased opportunities for employment and training in the local population.**

Detailed information from initiatives analysed:

Austria: several legislative and policy frameworks in place to improve energy efficiency.

- **The Austrian Energy Efficiency Act (Bundes-Energieeffizienzgesetz – EEffG):** Austrian legislation for the implementation of the EU Energy Efficiency Directive. It sets quality standards for energy advisors and auditors – key actors in achieving energy efficiency goals. To be legally recognised as an energy advisor or auditor, professionals must fulfil minimum qualification requirements (completion of technical training in the field of energy efficiency, 3 years of professional experience in the field during the last 5 years in addition to acquire the expertise required for the job by an energy specific further education)
- **The Austrian government programme 2020-2024** includes a phase-out plan for fossil fuels in space heating and cooling as a crucial aspect for achieving Austria's climate protection targets (including climate neutrality by 2040). To achieve decarbonisation goals, there is a need for more skilled professionals capable of installing high quality renewables systems (including heat pumps). This programme (like many of the others specified in this review) highlights that the government's decarbonisation targets are
- key drivers for the heat pump market and offer a large opportunity for the HP4ALL project.
- **The National Energy and Climate Plan (NECP)**, adopted in 2018, provides the framework for action in terms of Austrian climate and energy policy up to 2030. To



achieve goals in the buildings sector, the following measures specific to training are defined:

- including energy efficiency and climate protection in learning curricula and technical training programmes;
 - improving training for professionals.
- **The Upper Austria Energy Strategy - Energieleitregion 2050:** this strategy sets the energy policy goals of the region of Upper Austria regarding renewables, efficiency and greenhouse gas reduction. the strategy explicitly foresees communication and trainings measures including:
 - information activities, end-user awareness raising, training and further education for a range of target groups
 - training and further education offers
- **The Upper Austria Long-Term Renovation Strategy:** key aspect of training in the fields of buildings and energy efficiency. In Upper Austria, the training of relevant stakeholders through the ESV's Energy Academy, and the training of qualified energy advisors are defined as main elements of the Upper Austrian Long-Term Renovation Strategy.

Ireland: Ireland's future upskill policies will both directly and indirectly affect both the nZEB and green skills sector and thus impact the renewable heat generation and thus the HP deployment and training sector. **Ireland has a number of legislative & policy measures / funded projects etc that will impact the future of the training and skills sector.**

- **2021 Climate action plan is a result of the new Climate Action and Low Carbon Development (Amendment) Bill 2021:** legal framework outlining how Ireland will reduce its GHG emissions by 2050. This plan is in a consultation period and is expected that it will build on the 2019 Climate Action Plan which contained 183 actions broke down into 619 individual measures, eight of which relate to heat pumps in the areas of up-skilling and training, awareness campaigns, review of heat pump grant support, heat pump standards development, registration schemes for competent installers and advance the building regulations for new builds in relations to heat pumps. This initiative shows that policy can influence heat pump deployment and training, and that expert voices can input into policy.
- **The Action Plan for Apprenticeships:** five-year strategy to deliver on the Government commitment of reaching 10,000 new apprenticeship registrations per year by 2025. It establishes a roadmap to a single apprenticeship system and new support for employers and apprentices, which should provide a high quality and innovative approach, employer driven responses, apprenticeships for all (to match the profile of the general population), a valued option as well as a single coherent system. This provides a structure for developing new apprenticeships from an employer led perspective, which could allow for the development of one with a focus on heat pumps, for example a domestic retrofit apprenticeship.
- **Skillsnet Ireland, Climate ready initiative:** it supports businesses to increase
- enterprise training, specifically with the 'climate ready' initiative, in order to equip them with the skills they need in order to respond to climate change. Support will be given in the form of live and online workshops, masterclasses and mentoring, as well as through two programmes, the first of which is called the Sustainability pass, which is to develop awareness knowledge and skills in sustainability areas, and the second is the Energy



Leader Programme, which is supported by SEAI and aims to assist businesses and energy providers with practical sessions on how to reduce energy waste, deliver cost savings and protect the environment.

- **Digital Academy for Sustainable Built Environment (DASBE):** It will provide opportunities from apprenticeships to master's degree level in sustainable built environment, supporting the construction industry. Going forward, DASBE will create a digital platform to enable learners to gain micro-accreditations, special purpose awards, minor and major awards focusing on special topics, needs and requirements in the Sustainable Built Environment sector, as well as collaborating with 3 educational institutes. A strength of this programme is its ability to rapidly design, develop and deploy education and training programmes for construction workers that are flexible and responsive to the needs of the building sector.
- **Waterford and Wexford Education and Training Board's (WWETB) Heat Pump Programme:** it provides training to apprentices working in the construction sector and has thus identified the need for a course in heat pump maintenance and servicing, and so therefore the course is in development. The aim of the course is to increase the workforce so that they can respond to the increasing demand for the installation and maintenance of heat pumps in Ireland, and it is thought to be the first of its kind in the country.

Spain: Comprehensive approach to the modernization of the building sector includes education and training as part of its approach and could be replicated in other countries.

- **Spanish Long-Term Strategy for Deep Building Renovation:** This strategy includes a specific section (section 9) regarding professionalization, modernization, education, and training to promote the emergence of a professional and modernized workforce that focuses on renovation. It puts an emphasis in vocational training.
- In 2018, changes to the public procurement system allowed public administrations to demand the use of BIM methodologies, skills, and trainings in the delivery of projects and work contracts, and this led to the offer of BIM training courses significantly

increasing in both universities and professional associations.

- the Spanish General Council for Vocational Training has created working groups to define recommendations for updating the VET system (dual VET, accreditation of professional competences acquired through work experience)

Best Practice Examples in training:

Best practice examples were identified for the literature review in Austria, Denmark, Finland, Germany, Ireland and Spain. **All these examples found are replicable in other countries or areas because they provide a good framework which give learners high-quality education on the installation and maintenance of heat pumps, in response to the increased demand for qualified installers.** Many countries have identified that there are not enough skilled workers in this area, and the examples could provide a basis for the extension of training. It is important to provide employees with the skills needed by employers, and to ensure that there is a list of qualified practitioners to give the public increased confidence in the quality of work to be carried out.

Detailed data extracted from analysis:



- Multi-country: EUCERT training program launched by EHPA (it covers Austria, Belgium, Czech Republic, Denmark, Italy, Finland, France, Germany, Hungary, Poland, Portugal, Slovakia, Sweden, and the UK). End-to-end aspects of the HP are covered (theoretical and practical model).
 - o Directed to HP installers and technicians, providing training in accordance with Article 14 RES directive.
 - o “Certified HP Installer” Certificate – listed in EHPA’s database of HP installers.
 - o it is designed to be accepted in all European countries, so that installers are not restricted by borders. It is easily replicable – any country can register with EHPA and participate in training.
- Denmark: “heat pumps for increasing energy efficiency” webinar – Danish Institute of Technology. Overview of HPs themselves and emphasis in their integration of HPs into sustainable heating and cooling solutions.
 - o The webinar lasts for 2 hours and provides an overview of heat pumps themselves and their possible incorporation into the heating and cooling industries, with a focus of the integration of heat pumps into sustainable heating and cooling solutions.
 - o Concise information (technology, application, and economical aspects)
 - o Replicable to encourage those who already have a HP installer or plan to install one.
- Finland: heat pump training program by Danfoss. Provides elemental knowledge on heat pump’s working principle, refrigeration cycle, heat pump components efficiency calculation, various types of heat pumps and its application to the market
 - o 3/4h course
 - o Very accessible and replicable due to short format – attract attendees from across the spectrum
- Germany: “Planning and installation of heat pump systems according to VDI 4745 sheet 1 category PE” Training Seminar by Bosch. The main aim of the seminar is to provide candidates who are confident in taking responsibilities of the activities in planning, advise, operation and repair of heat pump systems
 - o To access the course, the attendee must have a background as a master, technician, or engineer in the fields of heating, cooling, ventilation, sanitary or electrical engineering.
 - o Planners and installers of HPs: guidance on planning, commissioning, and maintenance. End-to-end aspects of HP systems
 - o Replicable: understanding methods and approaches German companies are using to influence the development of the HP market
- Ireland: emphasis on upskilling those who already have previous experience or background in plumbing, and who want to expand and build on this experience.
 - o METAC Domestic Heat Pump system’s 5-day course: basic understanding of hp installations and design.
 - useful tool for those who want to quickly learn the basics of domestic heat pump installation and design.
 - Those who complete the training are added to the SEAI database as qualified installers – gain credibility
 - o Dundalk Institute of technology: 10 weeklong level 6 courses for HP installers: fundamentals of domestic and small commercial hp installation



- Those who complete the training are added to the SEAI database as qualified installers – gain credibility
- Spain: Heating and Air Conditioning (HVAC) course by WakeTech. Provide understanding of HP controls.
 - No prerequisite to participate – entry level skills are developed during the course
 - Easy replicable, it is for those starting their career. Those trainees could support and encourage homeowners to install a HP.

4.1.4. The End users survey report (T4.1.)

It represents an evaluation of current public and market acceptance of HPs that aimed to target end users across different categories (residential, non-residential; building owners, building managers; public, private etc.). Each having their own specific influences and demands on the market for skills and quality. This task examined the readiness of end users to accept HP implementation. LIT, with assistance from IERC and RINA-C, developing tools and resources (e.g., interview questions, online surveys in M2) used with consumers in each pilot country, evaluating their current attitudes and opinions towards HPs. These questions covering: the real or perceived risks of using HPs, opinions on ease of operation & maintenance, perception of installation and operating costs, suitability for use in different situations, knowledge of how/where to find information about HPs, new innovations, and emerging solutions etc. A particular focus being placed on knowledge and skills within the market, and end-users' perceptions and expectations in this regard. Each region selecting and applying appropriate tools to gather the data, identify critical trends and issues to be addressed for end-users. The consortium using their respective networks to facilitate participation from 15-30 building owners/end users in each region. LIT collating the results from the survey into a report (D4.1) in M4. With the outcomes from this survey informing the development of the Knowledge Hub and Performance Tool in Tasks 4.2 and 4.3 while also supporting the development of the Awareness Campaign in T4.4.

With the main findings of the work, selected below.

The Survey and interviews identified the **main areas of concern from the perception of the end user in each region: High investment costs, lack of competency training for installers and lack of quality information for end users are the main areas of the HP**

market requiring attention.

HP performance is heavily influenced by the competency of designers, installers, and commissioners which could explain the group of HP owners that are not satisfied with the performance of their HP, the more transparent the exchange of information between designers/installers and end-users can relate to the satisfaction of the performance of the HP and the installation. **The need for competency in designers/installers is paramount to the success of the HP market.**

Upper Austria has a well-established residential and non-residential heat pump market.

In part, due to greater training and certification programmes available for installers.

Respondents were from the industrial sector and had a good knowledge of heat pumps.

To make large scale projects financially feasible, respondents felt it would be necessary to include a mix of uses (heating, cooling, and hot water) and a mix of energy sources for the heat pumps.



Outside of the normal sources of air, ground and water, waste heat is seen as an untapped resource although challenges exist if this source is unavailable at certain times, i.e., at weekends when industrial processes are not operating.

The main barriers identified: the need for case studies and access to financial incentives and concerns about operating and maintenance costs. These could be addressed through provision of information to building owners and operators on all aspects of project planning and funding with an emphasis on case studies from successful projects.

In **Ireland**, the HP market is still in its infancy, most of the respondents to this survey were heat pump owners from the residential sector who had systems installed between 2015 and 2020 for space heating and hot water. Most of these end-users found heat pumps to be cost effective and were satisfied with their installation although some had problems with evaporator ice build-up on air source heat pumps and other commissioning related problems.

Interest in heat pumps stemmed from concerns for efficiency and using sustainable and renewable energy but barriers exist in obtaining good information on operating setup, economic aspects, and real-world performance data. **Concerns exist regarding installer competency and related lack of maintenance support and a lack of credible case studies. A decision-making tool was the main resource that these end users would like to see.**

In **Spain**, HP knowledge ranges from fair to poor, but paradoxically the HP market is well established.

Respondents to the Spanish survey were from both the residential and non-residential sectors, mostly from the public sector. Heat pumps are used for cooling in daytime and heating at night-time with not much focus on the production of domestic hot water. It was recognised that because a significant proportion of heat pumps were installed pre-2005, the buildings involved are mostly in need of energy retrofitting to reduce their cooling and heating loads. Operating cost and the possible impact of refrigerants on the environment were also of concern. **Installer training can prevent higher maintenance costs and frequency, increased energy efficiency and more competent installers.**

These end users had considered heat pumps because of their efficiency, the fact that they use renewable energy and that no fuel other than electricity is required. However, to increase uptake of heat pump installations, they felt that improved and additional incentives for renewable energy sources are required. **value in a decision-making tool to aid people making decisions on installing or upgrading heat pump systems.**

4.2. Input from other likeminded projects

With the assistance of the 'buildup.eu' initiative, a set of webinars focusing on sustainable energy skills in the construction sector was started. This endeavour, not only offering an efficient dissemination portal, but also connecting stakeholders and EU funded projects that are in the same (or similar) field, with broadly comparable sets of objectives. Indeed, the Competency Framework benefiting and building upon, work that was or is being carried out in likeminded projects such as:

4.2.1. BIMEET

BIMEET is a project that leverages the take-up of ICT and BIM through a significant upgrade of the skills and capacities of the EU construction workforce. The project is built around a strong consortium relying on educational and research & technology expertise, robust experience of



accrediting bodies, training supply chain and a wide engagement of industry led best practice. Focusing on the creation and implementation of qualification and training schemes for building professionals and blue-collar workers³.

Perspective on skills and training requirements:

Skills and competencies need to be developed to actively promote the widespread use of BIM based transversal and multidisciplinary collaborative approaches and methods in the European (and beyond) construction industry, currently facing fragmentation and inadequate training resources. Training and education programs will raise awareness of stakeholders in the construction value chain about (a) environmental challenges, (b) current and future sustainability scenarios, and (c) energy efficiency targets, EC, and governments agendas, with a view of delivering informed built environment interventions across lifecycle and supply chain underpinned by an effective BIM-based training Europe-wide agenda.

Due to the recent and rapid increase in demand for BIM professionals, the current competence development, training, and educational practices are often based on reactive and a planning, while a well-researched and time-tested best practice for diverse BIM competence requirements is yet to emerge. Therefore, we need structured understanding, assessment, and measurement of BIM competence of a person or a team, contingent on their role in the BIM ecosystem.

Training requirements for training in BIM for energy efficiency⁴.

This section identifies a set of general and specific requirements for developing BIM skills, competencies, and training with particular emphasis on energy efficiency.

The key findings reveal that construction industry still faces many issues and barriers with respect to socio-organisational, e.g., ‘people resistance to change’; legal, e.g., ‘lack of defined liability for wrong or incomplete information input’; financial, e.g., ‘training cost’; and technical, e.g., ‘lack of technical training’ that leads to negative impacts on team collaboration during the project.

- **The skills they require to handle BIM data for energy efficiency**
 - Designer: Formulating the model with energy efficiency simulation programs, maintaining data of different varieties and solutions. Good communication between designers, clients, and suppliers.
 - Blue-collar worker: Basic understanding of use cases at design time, communication with clients and contractors to ensure best practice.
 - Contractors: Knowledge on how to use BIM and training ability to implement BIM for energy efficiency, collaborate with the designer to manage the information from the model.
- **The skills are lacking now for using BIM for Energy Efficiency**
 - The link between different software-tools, finding suitable solutions to promote BIM in EE, understanding the impacts of using BIM for EE.
- **The ways to enhance the stakeholders' skills for using the BIM for Energy Efficiency**
 - Blue-collar workers: Training and field meetings to explain the specific plans.

³ http://www.bimeet.eu/files/Bimeet_flyer.pdf

⁴ https://projectsites.vtt.fi/sites/bimeet/files/D2_1%20BIM%20for%20energy%20efficiency%20requirements%20capture.pdf



- Designers/Engineers: Energy, BIM and data management training and educating, understand the essence of simulation and to apply the results in practice.
- **The training in BIM for Energy Efficiency by organisation**
 - Teaching software programs; BIM for EE, Continuous learning: issue with standardisation, skills of BIM coordinators and BIM managers should be defined.
 - Contractors: Educating and training should be adapted based on specific requirements
 - Facility management teams: Ability to extract and update data.
- **The common barriers to use BIM for Energy Efficiency**
 - Lack of understanding the use of BIM, limitation in using different software-tools, lack of expertise in using BIM programs.
- **Recommendations to enhance using the BIM for Energy Efficiency**
 - Assessing the performance and appropriateness of the training mechanisms, tools should be utilised in the early stage of the project, incentivise the adoption of BIM for EE.

Means of recognizing competency⁵ : Someone can be referred to as competent when they have demonstrated an adequate level of proficiency in performing a particular role, activity, or task. In other words, individual competency cannot be generic and must be evaluated against the requirements of a specific position or role.

Types of competencies identified:

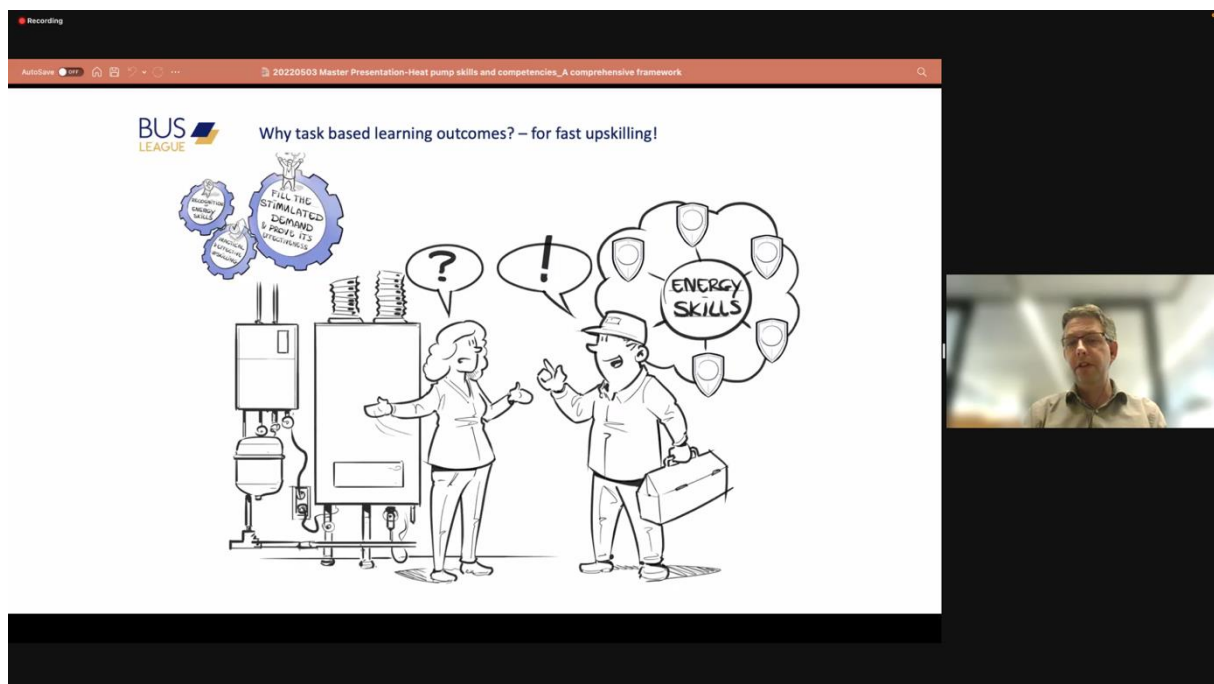
- **Managerial Competencies:** the decision-making abilities which drive the selection/adoption of long-term strategies and initiatives. Managerial competencies include leadership, strategic planning, organizational management (e.g., the ability to understand business benefits and business risks of model-based workflows).
- **Administration competencies:** the day-to-day organizational activities as required to meet and maintain strategic objectives. Administration competencies include contract administration, HR and recruiting, etc. (e.g., identifying BIM knowledge and skills for large collaborative projects).
- **Functional Competencies:** the non-technical, overall abilities needed to initiate, manage, and deliver projects. Collaboration, facilitation, project management. (e.g., the ability to facilitate a multidisciplinary BIM meeting).
- **Operation Competencies:** the daily hands-on individual efforts required to deliver a project or part/aspect of a project. Design, analyse, simulate, quantify. (e.g., the ability to use models to generate Bill(s) of quantities).
- **Technical competencies:** The individual abilities needed to generate project deliver across disciplines and specialties. Modelling, drafting, model management (e.g., the ability to use BIM software tools to generate error-free models”).
- **Implementation Competencies:** the activities required to introduce BIM concepts and tools into an organization. Component development, BIM library management... (e.g., developing protocols specific to generating and maintaining a Model Component Library).
- **Supportive competencies:** the abilities needed to maintain information technology and communication systems. File and network management, hardware selection (e.g., assisting others to troubleshoot basic software and hardware issues).

⁵https://projectsites.vtt.fi/sites/bimeet/files/D2_2%20BIMEET%20Benchmark%20of%20existing%20training%20offers%20Extended%20Abstract%20for%20Website.pdf

- **Research and Development competencies:** abilities needed to evaluate existing processes, investigate new solutions and facilitate their adoption. Change facilitation, knowledge engineering, teaching, and coaching. (e.g., the ability to monitor, select and recommend technological solutions that may enhance the deliverables of an organization).
- **Core competencies:** an individual's specialty, overall experience, market exposure and project experiences.

4.2.2. BUSLeague

BUSLeague is a project aimed at addressing and overcoming the challenges of the stimulation of demand for energy skilled workforce (demand side), along with hands-on capacity building to increase the number of skilled workforces across the building design, operation, and maintenance value chain (supply side). BUSLeague achieving this objective by developing and implementing a cross European recognition of energy skills, together with upscaling successful training methods and techniques which have already been developed in previous EU and National initiatives such as BUILD UP Skills, Construction Skills.



BUSleague qualification framework with the associated scope and format⁶. Based on recommendations from BUSLeague ethnographic research the **BUSLeague EE-skills qualification must address the following:**

- Consider that Clients (demand side) thinks in terms of concrete solutions & products rather than holistically
- Place EE Skills in “the bigger picture”
- Doubt & denial in feasibility and efficacy of EE
- The lack of understanding of the (basic/key) concepts and notions
- The lack of experience (practice) with implementation of nZEB

⁶ https://busleague.eu/wp-content/uploads/D2_4_full_version.pdf



- The entire construction and renovation value chain
- Stress on cross-trade collaboration on the building site
- The gap between theory and practice
- Better transfer of knowledge and experiences by cross trade awareness
- Decrease of the gap between regulatory (theoretical) requirements and available skills
- Integrated commissioning

The following scopes for qualification elements are distinguished.

1. Fundamental knowledge and skills: With a focus on the 'Why' of sustaining the built environment.
2. Cross-craft shared knowledge, skills, and responsibility: With a focus on integral quality of nZEB and retrofitting towards nZEB. Including the use of digital means and innovative measurement technologies. Extendable on the impact of circularity.
3. Occupation specific knowledge, skills, competence needed for professional practice: with a focus on a specific occupation.
4. Technology specific knowledge, skills, competence needed to install/realise...: With a focus on application on a specific technology

Implementation will be done at country specific and regional levels; based on a blend of measures to stimulate demand complimented with hands-on and practical upskilling of involved local and regional workforce.

Overview of main tasks and some subtasks

The tasks will cover the whole 'work process' and all actors involved. From orientation, setting ambitions to building in use (and when needed / available after use).

Proven approaches for the recognition of energy efficiency skills⁷. New requirements – related to the high energy performance of buildings or "nearly zero energy building standards" – are the main challenges for the construction industry across Europe. To be able to implement this sensibly, workers must be trained accordingly.

Much content and knowledge has been created through already implemented upskilling projects. In a first step, the situation relating to further education in partner countries is summarised. In the next step, results, and experiences regarding the recognition of energy efficiency skills and the associated effects on stimulating market demand are collected and analysed.

In this context, the report discusses the following problems and challenges of the partner countries. In Austria, France and Ireland, initial training is structured as an apprenticeship training system. **The recognition of initial training is fully developed at the national level in all partner countries. Unfortunately, there is hardly any focus on initial training in energy efficiency and renewable energies in most partner countries at present. Moreover, the offer of further education in the building sector is very limited in many partner countries. In all partner countries, however, further education modules on energy efficiency skills can be attended on a voluntary basis. Therefore, recognition is voluntary and not required by the government or the customers. In addition, there is hardly any national or international recognition of further education in energy efficiency**

⁷ https://busleague.eu/wp-content/uploads/D2_1_full_version.pdf



skills in Austria, France, Spain, and Bulgaria. In the Netherlands and Ireland, there is a well-developed system of recognition of further education at national level, but international recognition of these training courses is not satisfactory.

In general, the following applies in the construction sector at present: low price over high quality. For this reason, most construction companies are not interested in their employees attending training courses as this would result in higher salaries. Also, craftspeople cannot work on site when attending a course. Therefore, craftspeople are often not allowed to take part in time-consuming further education trainings.

Moreover, in the building sector, knowledge is often passed on within the company through experience. This acquired knowledge can lead to an improvement in quality but is not officially recognised. In addition, **low transparency of actual training courses plays a role in some countries.** Before attending a training, craftspeople cannot clearly see what the contents and benefits of the courses are and have no information about the recognition of these trainings. In Bulgaria, Spain, Ireland, and France, only a small number of further education courses is available in the field of energy efficiency.

- In Spain, skills according to renewable energy systems are not recognised in the market. One reason for this is, that there is no certification system for renewable energy trainings.
- In Bulgaria, training certificates are often issued by training providers without any quality assurance. As a result, there is very little trust in training providers and their training offers, which leads to nearly no market demand.

Finally, it must be mentioned that end consumers are not able to differentiate between skilled and unskilled craftspeople in the field of energy efficiency at present.

A possible solution to motivate blue-collar workers to participate in further education courses is to offer them a tailored in-house training and reduce the course duration to a maximum of one day. Furthermore, comprehensive quality management for the construction of nZEB, clear descriptions of further education training content and raising awareness for the importance of further education in the field of energy efficiency are required. To ensure high quality trainings, evaluation of available trainings, collaboration between training providers and the dissemination of cross-sector knowledge are essential. Establishing training and consultation centres for building professionals and end users is the basis for stimulating the market demand for nZEBs. Moreover, the development of qualification registers and Skill Passport systems endorsed by relevant branch organisations

and national authorities are necessary. With the project adding additional emphasis on ULOs (Units of Learning Outcomes) and micro learning/micro credentials.

Overview on country specific strengths and weaknesses in context with the mentioned problems, challenges, and opportunities:

	Strengths	Weaknesses
Austria	<ul style="list-style-type: none"> • Dual education system • Personal certification trainings on highly efficient and renewable energy systems are offered • Successful implementation (high market demand) of on-site cross-craft trainings (BUILD UP Skills CrossCraft) • Specific mutual comparable training modules are already available (NEWCOM) • The national quality label “klimaaktiv building standard” is established and becomes more and more important. 	<ul style="list-style-type: none"> • Hardly no recognition of upskilling courses in the field of energy efficiency and renewables • No trans-national recognition of upskilling courses in the field of energy efficiency and renewables • Further education is not required by the market • Hardly no awareness on the importance of cross-craft understanding • Further education trainings content is not shown transparently by most education providers • Construction companies show little willingness to provide further education to their employees
Bulgaria	<ul style="list-style-type: none"> • International certification and certification by product suppliers possible and valued • Trainings are flexible and have a short duration, to meet the needs of craftspeople (blended learning approaches) • Certification on international standards (e.g. Passive House, LEED, BREAAAM) gain increasing popularity • Build Up Skills EnerPro, Train-to-nZEB, Fit-to-nZEB and CraftEdu stimulated the supply of nZEB-related qualification and certification services 	<ul style="list-style-type: none"> • Hardly no recognition of upskilling courses in the field of energy efficiency and renewables • Further education is not required by the market • Further education courses to improve energy skills are very limited • Lack of market demand for energy-efficient buildings in general • Hardly no awareness on the importance of cross-craft understanding • Qualification registers and Skill-Passport are met with strong resistance from the mainstream construction sector • Low quality of practical parts of further education courses • Construction companies show little willingness to provide further education to their employees

France	<ul style="list-style-type: none"> • The RGE certificate is required by the market, as it enables its clients to benefit from financial support from the state • The RGE certificate requires compulsory further trainings • The FIT trainings have been widely approved and recommended by operators and landlords 	<ul style="list-style-type: none"> • Hardly no recognition of upskilling courses • No trans-national recognition of upskilling courses in the field of energy efficiency and renewables • Further education is not required by the market • Further education courses to improve energy skills are very limited • Construction companies show little willingness to provide further education to their employees
Ireland	<ul style="list-style-type: none"> • National Framework of Qualifications provides a structure to compare qualifications based on nationally agreed standards • Irish Qualifications Framework for lifelong learning helps to compare recognised qualifications in Ireland with the rest of Europe • Since the Horizon 2020 Build Upon project, key stakeholders are aware of the importance of skills recognition to drive demand for upskilling 	<ul style="list-style-type: none"> • Hardly no awareness on the importance of cross-craft understanding • Users (homeowners and procurers) cannot identify construction workers who are upskilled in energy efficiency topics • No licensing system for building contractors (Contractors may set up as sole traders or register as companies without any vetting of competence or qualification) • Employers often do not realise the real demand for energy skills
Netherlands	<ul style="list-style-type: none"> • Well-developed national recognition system on further education (especially in the installation sector) • After the recognition of heat pump trainings, nearly all regions wanted an according training centre • Several regular education providers have incorporated materials from BUSstoB and BUS_N@W into their VET education • Daily growth in the number of BUILD UP Skills Advisor app users 	<ul style="list-style-type: none"> • Hardly no awareness on the importance of cross-craft understanding • Further education is not required by the market • Only very few upskilling courses on energy efficiency are obligatory by law • Skills formally acquired on the job do not count and are not properly valued
Spain	<ul style="list-style-type: none"> • The Spanish Ministry of Education has a very detailed qualification framework (QF) for blue-collar workers organised by modules • The Ministry of Spain already has a methodology to recognize the skills of blue-collar workers acquired through experience 	<ul style="list-style-type: none"> • In Spain, there are no training requirements to work as a blue-collar worker in the construction sector • Both vocational training and university training include some aspects related to energy efficiency, but not certified training related to energy efficiency of buildings that addresses this issue as a whole

4.2.3. INSTRUCT

INSTRUCT is a project that introduces changes in the requirements for construction workers highlighting the close link between energy skills and the energy performance as well as the effect of reducing greenhouse gas emissions. In addition, the INSTRUCT project also supports legislative changes, thanks to which energy skills will need to be confirmed by certificates, desired by investors. The top-down and bottom-up activities in the INSTRUCT project are



intended to eliminate the existing shortage of construction skills and thus to create buildings that are 100% energy efficient⁸.

Objectives:

- Quantitative and qualitative evidence that corroborate and reinforce the correlation between skills and education and energy performance and quality.
- a set of tools and instruments facilitating the mutual recognition of energy skills and qualifications in the construction sector.
- real-world demonstrations (in 5 geographical European areas) of the usefulness and ease of use of the deployed instruments for recognition of energy skills and qualifications.
- dissemination and awareness raising actions in consortium members countries, scaled up to the wider Europe.
- new legislative frameworks enabling reliance on skilled workers in public / private procurement.

Correlation between training and energy efficiency⁹: The aim of this study was to deliver the industry and academic evidence that corroborates and reinforces the correlation between (a) skills and education, and (b) energy performance and quality.

The discussion section is structured according to the 5 themes:

- **Lack of access to useful information, knowledge, and best practice guides for energy efficient interventions.**

In the literature review, it was highlighted by recent studies how the lack of training is currently one of the most significant challenges in the effort towards a sustainable future (Shapiro, 2016). In the construction sector, the importance of training has also emerged as a critical element towards energy efficiency, on a global level (Aerschot et al., 2009). In this spirit, strategies such as increasing access to on-job training, has been pointed out as significant towards the effort of improving the landscape of training for energy efficiency (Rezgui, 2020). These observations seem to point at the fact that:

- on one hand there is a need to increase our efforts towards the dissemination of knowledge in the field of energy efficiency
- at the moment, there are issues of access to information, lack of awareness, and, in general, not a very systematic effort towards education in the field.

It seems that even though the information is present, training is available, and initiatives for training are taking place what needs to significantly improve is the overall culture about educating professionals on energy efficiency in the construction sector. Discrepancies seem to appear when it comes to establishing an ongoing, fervent climate in the construction sector that will bring training at the centre of these efforts.

- **Lack of demand for skilled workforce in energy efficiency.**

The demand for energy efficiency and energy efficiency skills remains a crucial issue for the market and the sector. As a general observation, it could be argued that demand is

⁸ <https://instructproject.eu/#:~:text=The%20task%20of%20the%20INSTRUCT,of%20reducing%20greenhouse%20gas%20emissions.>

⁹ <https://instructproject.eu/wp-content/uploads/2022/03/INSTRUCT-Correlation-between-training-and-energy-efficiency.pdf>



highly dependent not only on the context, fluctuating from geographical region to geographical region, but most importantly on the focus that is placed on energy efficiency in the construction sector, which goes back to deeper and more structural issues of general awareness about the issue, and therefore is dependent on where priorities on all levels of stakeholders are set.

- **Lack of availability or inadequate training programmes (in terms of scope, quality, content, cost, etc.)**

The lack of availability or the inadequacy of training programs seems to emerge as a significant issue. On the positive side of things, it is significant that progress has been made, and we are at a level of being able to assess the quality of training programs and their results within in a long-term framework. However, it could be argued that there is a long way ahead, and that there is a wide variety of factors and equilibriums that need to be investigated much more closely, and in detail, as suggested by the data collected.

- **Lack of shared vision and values for energy efficiency across the supply chain**

There is a need to coordinate the industry in such a manner that the importance of training for energy efficiency becomes a strong and shared value and a starting point of actions and initiatives.

- **Inadequate policy landscape, including lack of government incentives**

Overall, it could be argued that an inadequate policy landscape is a reality affecting the sector in various ways and on several levels. There is a need for further improvement of the efforts on both a European as well as a national levels and efficient strategies need to be found, towards this direction, as well as collaborative schemes.

To conclude, based on the hypothesis that has been posited at the beginning of the study and as elaborated in the Discussion section, it can be argued that the statement stands: **Quality training can, indeed, have a positive impact on energy efficiency in the construction sector and can contribute to sustainable interventions in the construction sector.**

Requirements for new instruments for skills recognition in the construction industry¹⁰.

The aim of this report is to elicit the requirements for new, and existing, tools facilitating the mutual recognition of energy skills and qualifications in the construction sector.

This translates into the following objectives:

- identify best practice initiatives for energy skills recognition across Europe.
- inform the development of new tools adapted to a wide range of country-specific organisational and cultural work practices across Europe.

As such, an overarching requirement is identified in the need for a widely accessible and trusted digital platform that can allow:

- training organisations to register their training offers and associated learning outcomes.
- accreditation organisations to assess these and publish their accreditation outcomes.
- white and blue workers to register their skills and trainings.
- employers to search and recruit the skilled workers most suited to their job across Europe.

¹⁰https://instructproject.eu/wp-content/uploads/2021/10/INSTRUCT_Requirements-for-new-instruments.pdf



It is interesting to note that the job market has been deregulated because of the ongoing pandemic and the restriction of movements of staff. The recruitment of skilled workers, therefore, transcends existing geographical boundaries while promoting a competitive landscape for skilled workers adapted to a wide range of country specific organisational and cultural work practices across Europe.

Blockchain is identified as a contender solution to deliver such digital platform, which will be augmented with a wide range of services allowing the delivery of:

- passports/registers for workers at regional/national level and support for their take up at EU level.
- mobile applications facilitating the comparison of workers' skills and qualifications between countries
- new legislative frameworks or public procurement practices
- initiatives for home and building owners
- new partnerships with producers and retailers.

4.2.4. The NZEB Roadshow

The NZEB Roadshow designing and constructing mobile training and demo units that will serve as information centres to raise awareness of the benefits of nZEBs and will create the necessary conditions for effective communication between stakeholders. With very careful attention to exterior and interior design, the centres will offer real-life experience of quality nZEB and will be equipped with all necessary technologies to provide full information of the processes with relevance to the building's performance in terms of comfort, internal air quality parameters and energy consumption¹¹.

The project document, "Report on the training facilities designed and produced in the pilot countries"¹² summarizes the activities carried out by each individual partner from the participating countries (Bulgaria, Croatia, Greece, Italy, and Romania) regarding the design and construction of mobile demonstration units to support the organization and conduction of dedicated nZEB days around the territory of each country. The task is focused on the design and construction of transportable demonstration and training facilities and on the development of specifications for spatial planning for successful organization and conduction of the nZEB days.

Each partner, according to their capacities, the respective country's typical construction traditions, the type of planned events and the target audience foreseen in each event, designed, and realized different training facility. The realized training facilities are described: mobile home units (MHU), mock-ups, games and other staff used to train, demonstrate and in general involve people during online and off-line nZEB Roadshow events.

4.2.5. CraftEdu

CraftEdu a project developing and expanding upon the voluntary initiative "Building Future" aimed at supporting energy efficiency and use of renewable energy sources in buildings, including support to training of construction professionals by employers¹³. With the main challenges being identified as:

¹¹ <https://www.nzebroadshow.eu/about.html>

¹² https://www.nzebroadshow.eu/uploads/9/8/8/4/9884716/d3.2_nzeb_roadshow_report_on_training_facilities.pdf

¹³ <https://www.craftedue.eu/>



- **Low quality** of construction works on-site directly influencing energy efficiency in buildings.
- **Structural changes** in construction industry and technological changes related to energy efficiency and development of renewables.
- **Decreasing number of pupils** at the construction professional schools and low interest of youth to the construction industry.
- **A significant gap** between the skills of the construction workers and the market demand

The Catalogue of Learning Outcomes includes compendium of knowledge, skills, and responsibilities that the learner is supposed to possess after finishing CraftEdu training programme. The Units of Learning Outcomes (ULOs) in this document were developed in number of consecutive steps¹⁴:

1. Identification of nZEB-related topics that are needed for craftsmen education were identified. Various sources were used, namely Fit-2-nZEB, StavEdu and other H2020 and Build-up-skills projects. Inclusion of topics was discussed among consortium partners.
2. Comparison of selected topics with national craftsmen' professional standards issued by national qualification authority. The objective was to find gaps in national standards regarding nZEB topics.
3. Afterwards identified topics were compiled into final ULO nomenclature, i.e., knowledge, skills, responsibility, and autonomy.
4. Finally, these topic oriented ULOs were attached to individual professions.
5. Throughout the process, validating workshops were held to check for possible omissions and to keep consistency.

The catalogue includes 8 Units of Learning Outcomes, each for a different construction vocation set in the project documentation. The occupations are:

1. HVAC installer
2. Carpenter
3. Electrician (High voltage)
4. Installer of windows and doors
5. Hydro-insulator (roofs and foundations)
6. Electrician (Low voltage)
7. Chimney sweeper – Installation of chimneys and chimney liners
8. Chimney sweeper – Inspection technician

In the report were used the following definitions, introduced in the Council recommendation:

- **“knowledge”** means the outcome of the assimilation of information through learning. knowledge is the body of facts, principles, theories, and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.
- **“skills”** means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive

¹⁴ https://www.craftedu.eu/uploads/9/8/8/4/9884716/d2.1_ulos_for_developing_educational_curricula.pdf



(involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);

- **” responsibility”** and autonomy’ means the ability of the learner to apply knowledge and skills autonomously and with responsibility.

Based on units of learning outcomes (D2.5)¹⁵, particular training programmes are defined, and their parameters set – what is to be learnt, which methods are to be used, how much time is to be spent for each topic and who would sponsor each programme. There are national sections that overarch all professions and individual professions for each country

Czech Republic

Curricula for Czech Republic cover all professions. Most of them are shared with other countries apart from HVAC Installer and two Chimney installer professions. The reason for this is that there had been a gap in nZEB education for blue collars construction workers so far compared to other project countries. CraftEdu project is first comprehensive activity aimed at improving the situation.

Forms of education:

1. Classroom courses max one day – 6/8 hours including excursion EE models
2. E-learning via database at SEVEN server 10 hours
3. Video materials by ABF Audio-visual centre 2 hours
4. Self-study
5. Exhibition trade expo: o lectured visit 4/6 hours Excursion to interesting buildings, construction, or possible visit at trade, manufacturer’s demonstration centre also in cooperation with technical schools and vocational schools.
6. One-day project conference for all professions organized by ABF 6 hours

Slovakia

The StavEdu scheme offers 10 cross-trade training programmes of further education and training of craftsmen and on-site workers in the field of buildings on energy efficiency and use of renewables in buildings. The CraftEdu training programmes will complement StavEdu scheme with 5 one-craft programmes that were identified in implementing StavEdu scheme as needed to address several specific issues and needs of Slovak construction sector.

Forms of education:

1. In class courses – min 3 days/24 hours, including practice and summary of acquired information and skills
2. Distance learning – using study of learning materials and E-learning via database at SEVEN server

Austria

- Certified Installer of blow-in insulation
- Application possibilities for blown-in insulation
- Flatroofing and Waterproofing

Forms of education:

Education will be organized in two forms: 1. In class courses – min 3 days/24 hours, including practice and summary of acquired information and skills. 2. Distance learning – using study of learning materials and E-learning via Moodle

¹⁵https://www.craftedu.eu/uploads/9/8/8/4/9884716/d2.5_curricula_for_9_training_programmes_for_targeted_craftsmen_and_on-site_workers.pdf



Bulgaria

- Windows installer and hydro-insulator were prepared to be used in Bulgaria.

Forms of education:

The suggested curricula are applicable for courses for acquiring of qualification on part of profession, as shorter versions are also prepared for upskilling already qualified professionals with only nZEB-relevant ULOs. The curricula is suitable for a blended learning system, as depending on the available resources and equipment of the VET provider, education could be performed by a mix of the following methods:

Classroom courses: up to 16 hours:

The teaching process should be focused on the selected topics, material, technologies, EE approaches and necessary skills to apply these in practice, and should apply a universal approach and share commonalities with all professions through the interpretation of the energy-saving principles of buildings, with examples of their penetration and influence between individual crafts

- E-learning via database of EnEffect or possible e-learning tools set up by the Ministry of Education: 8- 10 hours
- Practical training (16 hours): Hands-on training using demonstration and practical training models under specifications available through Train-to-NZEB and Fit-to-NZEB projects. Where applicable, organization of on-site training
- Video materials: available through international projects: 2 hours. Several video training materials are at disposal of EnEffect and publicly available for other training providers through the BUS EnerPro, Train-to-NZEB, ConClip and other EU-supported projects, many of them translated in Bulgarian. In addition, several smartphone apps are also available, although currently only in English.
- Self-study: 8 hours.
- Study visits: lectured visit 4/6 hours. Excursion to interesting buildings, construction, or possible visit at trade, manufacturer's demonstration centre also in cooperation with technical schools and vocational schools. One-day project conference for all professions organized by EnEffect or relevant professional chambers and branch associations: 6 hours.

The developed training programmes were demonstrated by pilot courses to test and validate the programmes and, if needed, to fine-tune the content of the training. Pilot training was evaluated on an ongoing basis. According to the feedback from the participants, they appreciated the improvement of skills, knowledge and competences delivered by the training, and their evaluation was mostly positive. This included teachers and apprentices enrolled in the vocational training at secondary level schools in Slovakia (see the table of collaborating secondary schools in Section 4). The developed programmes are complementing their curricula and bringing up-to-date information on aspects of nZEB¹⁶.

The new model of the online training course includes:

1. Online courses and e-learning programmes.
2. Video presentations with comprehensive nZEB-related content.

¹⁶ https://www.craftedu.eu/uploads/9/8/8/4/9884716/craftedu_deliverable_d4.2_pilot_training_courses_in_slovakia.pdf



3. Learning texts for each profession and trainer's handbook for the trainer/teacher.
4. Video presentation and demonstrations focused on the knowledge and skills of individual professions.
5. Evaluation tests for each e-learning programme that was required for completing and recognition of the training.
6. Online discussion between lecturers and students.

The project website www.databazecraftedu.cz serves as a platform of online training of professionals. Subject to registration, professional educational programs are available to download. The present solution of the training programmes and format is a chance for a long-term sustainability, promising a wider use of the prepared programs than with the original classical teaching concept. The new form called for a completely revised approach to the project outputs, marketing, and dissemination. Most of participants have evaluated the training courses very positive. More than 60% of the training participants in Slovakia have indicated, that they will use the new knowledge gained from the training programme in their profession. By the end of November 2021, all four target countries had implemented the pilot programs in a larger scale, than it was planned.

4.2.6. TRAIN4SUSTAIN

TRAIN4SUSTAIN aims at making comparable and unifying the current qualifications in sustainable energy across Europe. Doing so will help converge contents, curricula, and trainings to be "state of the art". This implies that energy professionals' qualifications will be valid across borders, making it easier for them to find a job abroad. To make this possible we are developing a European Skills Registry, a Skills Passport, an e-Inventory and a Match-Making hub. TRAIN4SUSTAIN will harmonise and integrate the results of initiatives, competence schemes and standards to promote a common understanding of competence standards in sustainable energy in the EU. The practical usability and exploitation of the common qualification standards will be enhanced through a European Skills Registry (ESR). The ESR will be a web-based Platform providing functions for comparing various qualification schemes and learning outcomes and allow listing qualified experts on a match-making hub¹⁷.

The European Skills Registry (ESR) will be a web-based Platform providing functions for comparing various qualification schemes and learning outcomes and allow listing qualified experts in central experts database connected to a match-making hub. The ESR will be a central electronic database for qualified experts listed under the umbrella of the TRAIN4SUSTAIN standard. The database will also provide different functionalities like a user interface and a match-making section (both also accessible via a mobile app from smartphones and tablets). The registry will be the central instrument for comparing qualification schemes in the EU and for increasing the visibility of professionals. It will provide an electronic interview mode for entering and evaluating existing qualifications schemes according to the new standard/framework and allow a self-classification and approval of skill levels for existing national qualifications (evaluation done by scheme operators). The registry will allow entering and display registered experts in terms of group of professional (e.g., designer, planners, blue

¹⁷ <https://train4sustain.eu/>



collar workers, facility managers, etc.), and their recognized skill level following the TRAIN4SUSTAIN competence quality standard¹⁸.

The Skills Passport will be a tool to foster easy and practical comparison of skill levels among different professions on a transnational level. The Passport will be used to proof equivalence of qualification schemes within the EU or neighbouring states. The Passport will be an additional document / annex to complement existing certificates for qualifications. It will support professionals of each profession to proof their level of qualification to clients using the new competence quality standard. National scheme operators also will have the benefit of being able to have a clear document stating the skill level of a professional, which will facilitate the mutual recognition of qualification in the EU¹⁹.

The e-inventory will be a convergence of e-learning and help desk, as well as a database storing information on training courses and training material content. It will allow professionals (customized according to profession) to access available training materials and related qualification courses in the field of sustainable energy skills from across the EU. Professionals will have the option to search for relevant training courses in their thematic area and to directly access the related websites for registering the training²⁰.

Registered Experts will be publicly accessible and will be listed in a **matchmaking hub** also being part of the e-registry. The matchmaking hub will be a marketplace for offering and searching experts for sustainable energy skills and projects in the EU. Highest transparency for potential customers will be ensured through the TRAIN4SUSTAIN qualification standard. Experts will benefit from better recognition of their skills among EU clients and can present their expertise to a broad network of potential customers (e.g., homeowners, public sector, builders, etc.)²¹.

4.2.7. Common elements identified

The European Qualifications Framework is a common European reference framework whose purpose is to make qualifications more readable and understandable across different countries and systems. The framework includes eight reference levels, which are defined in terms of learning outcomes. The purpose of the common frameworks for learning outcomes is to enable the comparison of qualifications across national borders and stakeholders. The use of common language makes such comparison possible.

National guides for plans of works for different roles and national guides for common BIM requirements were made use of in defining phases, tasks, and roles.

Construction industry and building projects has several roles and stakeholders. To define the European learning outcomes related to BIM and energy-efficient building, six categories were selected:

- Client & Clients advisors
- Architectural design roles
- Structural design roles
- Building services design roles
- Construction work roles

¹⁸ <https://train4sustain.eu/european-skills-registry>

¹⁹ <https://train4sustain.eu/skills-passport>

²⁰ <https://train4sustain.eu/e-inventory>

²¹ <https://train4sustain.eu/match-making-hub>

- Maintenance work roles

Box 1. European Qualification Framework (EQF)			
The European Qualification Framework joins the qualifications of different EU members together to facilitate mobility by relating different countries' national qualifications issued to a common European reference framework. Since 2012 all new qualifications issued in Europe carry a reference to the EQF Level which are set out below.			
	Knowledge	Skill	Competence
Levels	1 Basic general knowledge	Carry out simple tasks	Work under direct supervision in a structured context
	2 Basic factual knowledge	Carry out tasks and solve routine problems	Work under supervision with some autonomy
	3 Knowledge of facts, principles, processes and general concepts	Solve problems by selecting and applying basic methods and tools	Take responsibility for completion of tasks, adapt own behavior to circumstances in solving problems
	4 Factual and theoretical knowledge in broad contexts	Generate solutions to specific problems	Exercise self-management, supervise the routine work of others, taking some responsibility for the evaluation and improvement of activities
	5 Comprehensive, specialized, factual and theoretical knowledge and an awareness of the boundaries of that knowledge	Develop creative solutions to abstract problems	Exercise management and supervision, review and develop performance of self and others
	6 Advanced knowledge involving a critical understanding of theories and principles	Solve complex and unpredictable problems	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work, take responsibility for managing professional development of individuals and groups
	7 Highly specialized knowledge, critical awareness of knowledge issues in a field and at the interface between different fields	Develop new knowledge to be integrated from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches, take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
	8 Knowledge at the most advanced frontier of a field	Solve critical problems, extend and redefine existing knowledge	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research.

Learning outcomes are the explicit statements of what a learner is expected to know, understand, and can do after the completion of a learning activity. Learning outcomes discussed in this report refer to the intended learning outcomes (ILOs) rather than achieved learning outcomes (ALOs). Learning-outcomes-based frameworks enable the comparison of qualifications across different types of institutions and stakeholders. By providing a common language makes it possible to compare qualifications over national borders

Learning outcomes are specified in three categories – as knowledge, skills, and competence. This signals that qualifications – in different combinations – capture a broad scope of learning outcomes, including theoretical knowledge, practical and technical skills, and social competences where the ability to work with others will be crucial.



An example showing the basic structure of learning outcomes are presented in the below (original source CEDEFOP):

The basic structure of learning outcomes statements...			
... should address the learner.	... should use an action verb to signal the level of learning expected.	... should indicate the object and scope (the depth and breadth) of the expected learning.	... should clarify the occupational and/or social context in which the qualification is relevant.
Examples			
The student...	...is expected to presentin writing the results of the risk analysis	...allowing others to follow the process replicate the results.
The learner...	...is expected to distinguish between...	...the environmental effects...	...of cooling gases used in refrigeration systems.

The learning outcomes include requirements about understanding of BIM terminologies and definitions, BIM processes and BIM technologies and relevant guidelines for building information modelling. In addition, the learning outcomes also include requirements about performance-based building and the factors that have direct and indirect impacts. Although this work focuses on BIM and energy-efficiency, it is important to simultaneously pay attention to other important performance aspects. When designing and operating low energy buildings, energy consumption is never a separate aspect but is always closely linked to the aspects of indoor environment. Thus, learning outcomes for the management of energy performance with the help of BIM need to consider the overall building performance²².

This INSTRUCT report (Delivering Skills and Definition of Qualifications through Learning Outcomes Matrix in the EU)²³ presents the first version of EU wide learning outcomes defined and developed for selected roles and activities related to energy efficiency education. Due focus was provided towards the EQF, and its relative knowledge, skills and competencies based on the partner organizations. During this procedure, national guides for plans of works for different roles and national guides for common energy requirements were made use of in defining phases, tasks, and roles.

For example, in Finland guides for plan-of-work were formulated for architectural design, structural design, HVAC/MEP design, and management of building projects.

In addition, learning outcomes from previous stages of INSTRUCT and other relevant EE EU-projects were made use of in harmonizing the established European level frameworks. Construction industry and building projects has several roles and stakeholders. The learning outcomes include requirements about understanding of energy education terminologies and definitions, processes and technologies and relevant guidelines for building information modelling. In addition, the learning outcomes also include requirements about performance-based building, with a focus on factors with direct and indirect impacts on energy efficiency, other important performance related aspects should not be overlooked.

The learning outcomes can be grouped in basic units: a unit of learning outcome is a component of a qualification consisting of a coherent set of knowledge, skills and competence that can be assessed and validated. The learning outcomes will also be formulated according

²² https://projectsites.vtt.fi/sites/bimeet/files/D3_2%20BIMEET%20Definition%20of%20LOs%20in%20the%20EU%20level.pdf

²³ https://instructproject.eu/wp-content/uploads/2022/03/INSTRUCT_Skills-and-learning-outcomes-matrix.pdf



to the EQF recommendations (use of active verbs, parsimonious and comprehensible formulations). The learning outcomes matrix will also depend on the qualification level. In this report, we will target all existing levels (from 1 to 8) applied to energy efficiency in the Construction sector. Furthermore, there is a first attempt to create profiles for each professional role, based on the definitions for knowledge, skills, and autonomy and responsibility.

4.3. Research into Competency Frameworks from other fields

A brief look into the structure and rationale of Competency Frameworks from other fields will be used, as to complement (as well as inform and assist in the design of templates) our work. With a few examples below:

4.3.1. EU Competency Framework for the management and implementation of the ERDF and Cohesion Fund

Represents a set of user guidelines have been developed by the European Commission, DG Regional and Urban Policy (DG REGIO) to help administrations involved in the management and implementation of the ERDF and Cohesion Fund to implement the EU Competency Framework and Self-Assessment Tool ('the instruments')²⁴.

For each type of institution, the EU Competency Framework includes:

- Tasks and sub-tasks.
- Groups of job roles (3 groups: Decision maker, Supervisor, Operational level).
- Groups of competencies:
 - a. Operational competencies: required to perform the assigned functions according to the Regulations.
 - b. Professional competencies: required to efficiently perform specific professional functions.
 - c. Management competencies: required for employees with managerial functions and to a certain extent for operational employees.
- Proficiency scales from 0 to 4 associated to each competency.

The competency frameworks are specific for each of the following category, each benefiting from its own annex/s²⁵:

- National coordinating bodies.
- Managing authorities and intermediate bodies.
- Joint secretariats.
- Certifying authorities.
- Audit authorities.

With an example below:

²⁴https://ec.europa.eu/regional_policy/en/information/publications/studies/2016/eu-competency-framework-for-the-management-and-implementation-of-the-erdf-and-the-cohesion-fund

²⁵ https://ec.europa.eu/regional_policy/en/policy/how/improving-investment/competency/

Operational Competencies		Task → Programming							
		Operational level						Supervisory level	Decision making level
		Inter-institutional coordination and stakeholder involvement	Preparation of the Programme	Sub-task Definition of the guiding principles for selection of operations	Management of the evaluation process (ex-ante)	Negotiation with the EC	Procurement of goods and services under Technical Assistance		
MA.O.C1	General provisions of ESIF EU / National legal acts		4	4	2	4	2	3	3
MA.O.C2	National strategic documents (e.g. National Development Strategies, relevant thematic and sectoral policies)	Competency	4	Proficiency level	2	4	1	3	3
MA.O.C3	Eligibility of expenditure provisions included in ESIF EU / National legal acts (rules, guidelines and methodologies, including the scope of support)		4	2		4	3	3	3
MA.O.C4	Territorial issues, such as ITI, CLLD, Sustainable urban development, macro/regional strategies and interregional cooperation planning	3	3		2	3		3	2

Additionally, a summary of the competencies per each category (the competencies in the operational folder can change according to the specific category) can be found below:

Operational competencies	General provisions of ESIF EU / National legal acts
	European strategic documents
	Relevant thematic knowledge
	Eligibility of expenditure provisions included in ESIF EU / National legal acts
	Management of programme, priority or measure evaluation process
	Territorial issues, such as: Sustainable urban development, macro/regional strategies and interregional cooperation planning
	Ex-ante conditionalities
	Socio-economic analysis
	Intervention logic
	Coherence and complementarity with ESIF, EU and national policies and instruments
	Prioritising and planning financial allocations
	Additionality assessment
	Financial instruments design and implementation mechanisms
	Public procurement rules
	Horizontal issues
	Programme management and project cycle management
	Fraud risk, irregularities management
	State Aid
	Administrative organization definition and revision
	Assessment of ESIF system performance
	Development and maintenance of MIS
	Administrative burden assessment
	National strategic documents

	Input, output, results indicators Implementation mechanisms assessment Visibility rules Identification of different stakeholders and their information needs Management of relevant media Administrative procedures for procurement of goods and services from Technical Assistance Web communication Cross-border, transnational and interregional cooperation and European Grouping of Territorial Cooperation Management of the outsourcing activities Economic environment and reform processes Budgeting and cost estimation Audit standards, procedures and methodologies
Management competencies	Developing others and people management Decision making Delegation Facilitation and communication Leadership Multi-level stakeholder management Negotiating Result orientation Strategic management of goals and initiatives Risk management Planning of resources HR Strategy development and implementation
Professional competencies	Analytical skills Communicating in writing Communicating verbally Conflict handling Flexibility and adaptability to change Problem solving Teamwork Technological ability Usage of monitoring and information system Representation of the institution to the outside world Relevant language skills Intercultural skills



4.3.2. The Competency Framework - A guide for IAEA managers and staff

Represents the Agency's competency framework and includes core values, and core and functional competencies²⁶. The document is divided in three main parts: Core values, Core competencies and Functional competencies. Moreover, it provides a short introduction on what is a competency framework, its components, why and how use competencies.

- Core values are principles that influence people's actions and the choices they make. They are ethical standards that are based on the standards of conduct for the international civil service and are to be upheld by all staff.
- Core competencies provide the foundation of the framework, describing behaviours to be displayed by all staff members. They are defined by occupational roles for a given job.
- Functional competencies are defined by duties and responsibilities assumed by staff members for a given job. Based on the job complexity and level of responsibility, and the seniority of the occupational role, an average of three to five functional competencies are assigned to a given job.

Each competency is provided by a short description, and the referring indicators. And for the Core and the functional competencies, indicators and descriptions change according to the role (Individual contributor, manager, and senior manager).

Core values:

- Integrity
- Professionalism
- Respect for diversity

Core Competencies:

- Communication
- Teamwork
- Planning and organizing
- Achieving results

Functional competencies:

- Leading and supervising
- Analytical thinking
- Knowledge sharing and learning
- Judgement/decision making
- Technical/scientific credibility
- Change management
- Commitment to continuous process improvement
- Partnership building
- Client orientation
- Persuasion and influencing
- Resilience

Example of definition of core competency:

²⁶ <https://www.iaea.org/sites/default/files/18/03/competency-framework.pdf>

COMMUNICATION

	INDIVIDUAL CONTRIBUTOR	MANAGER	SENIOR MANAGER
DEFINITION	Communicates orally and in writing in a clear, concise and impartial manner. Takes time to listen to and understand the perspectives of others and proposes solutions.	Encourages open communication and builds consensus. Uses tact and discretion in dealing with sensitive information, and keeps staff informed of decisions and directives as appropriate.	Promotes an environment of open communication within and outside of the Agency, ensuring that sensitive information is protected. Inspires staff at all levels through his/her communication.
INDICATORS	<ul style="list-style-type: none"> Speaks and writes clearly and concisely by effectively identifying key points relevant to the subject matter; Actively listens, shares information, and proposes suggestions and solutions; Consults with supervisor/manager to gather his/her views in support of the message to be communicated; Expresses his/her views and concerns in an impartial and constructive manner with the intent to resolve issues; Seeks guidance from supervisors if they are unclear on whether information can be disclosed, consistent with their obligations with respect to Agency information, as set out in the Agency's applicable regulations, rules and policies. 	<ul style="list-style-type: none"> In consultation with the supervisor, keeps staff informed of decisions, presenting them in a manner that generates understanding and acceptance; Actively shares information and ideas, and encourages others to share their views and concerns; Uses tact and discretion in dealing with sensitive information or resolving delicate issues, paying attention to non-verbal cues; Uses professional judgement consistent with the Agency's applicable regulations, rules and policies on confidentiality requirements to determine information to be disclosed on activities to be implemented; Provides constructive and positive feedback to the team; Identifies and presents conflicting points of view to others in a fair and constructive manner and works toward achieving consensus. 	<ul style="list-style-type: none"> Has presence and bearing as an effective advocate of the mission and strategic direction of the programme; Creates an environment that fosters open communication within and across organizational boundaries and converts controversial or sensitive situations into opportunities; Makes himself/herself visible to staff by listening to them and by communicating at all levels within the Agency and with external counterparts; Convinces and engages others by using compelling arguments; Applies the utmost discretion and judgement in dealing with highly sensitive issues, taking into consideration the potential risks resulting from the improper use of information, and in compliance with the Agency's applicable regulations, rules and policies.

Example of definition of a functional competency:

LEADING AND SUPERVISING

	INDIVIDUAL CONTRIBUTOR		MANAGER	SENIOR MANAGER
	Associate	Specialist		
DEFINITION	Demonstrates initiative and role model behaviour. Is proactive and works toward supporting an achievement oriented culture and performance excellence.		Serves as a role model when leading and supervising others. Provides his/her team with clear direction, promotes a dynamic working climate and empowers others. Is open to new ideas and demonstrates creativity in search of excellence.	Serves as a role model to managers as well as to staff members in general. Demonstrates leadership, inspires others and provides clear direction to achieve the Agency's mandate and priorities. Motivates and empowers staff, and recognizes individual and team contributions to the Agency's success.
INDICATORS	<ul style="list-style-type: none"> Displays appropriate behaviour and contributes to creating a positive team spirit. Invests time and effort in managing staff members under his/her supervision (if applicable); Ensures that staff members under his/her supervision are clear on their role and responsibility (if applicable); Contributes to and supports the overall performance of the team or Section. 	<ul style="list-style-type: none"> Takes initiative in supervising staff members under his/her responsibility (if applicable); Ensures that roles and responsibilities within the team are clear, plans and reviews work, and assesses others' performance (if applicable); Remains alert to emerging issues and global trends that might benefit or otherwise impact individual and team's work; Creates regular opportunities for peers, colleagues, partners and stakeholders to contribute toward enhancing service quality. 	<ul style="list-style-type: none"> Develops strategies and plans that have a positive impact and add value for all partners and stakeholders; Provides direction, guidance and clarity on roles and responsibilities; Promotes a culture of learning and development, with a focus on continuous improvement; Empowers the team to generate creative ideas and solutions; Manages the performance of the team and ensures compliance with the Agency's regulations, rules and policies; Ensures that power and authority are not abused. 	<ul style="list-style-type: none"> Acts as a role model and motivates others to achieve the highest standards of quality and efficiency; Ensures that power and authority are not abused and demonstrates leadership and credibility in interactions with all partners and stakeholders; Provides clear direction and creates an enabling environment for others to reach their full potential; Promotes resilience and responsiveness to emerging strategic issues and opportunities for the Department/Division; Draws on insights from scientific or social trends and forecasts to better manage programmes and increase efficiency; Sees ambiguity or uncertainty as an opportunity to improve programmes and services; Ensures consistent application of the Agency's regulations and rules, and fosters the one-house approach and cross-functional cooperation.



4.3.3. OECD Competency Framework

Classifying jobs into families allows the Organisation to determine whether it has the capabilities necessary to achieve maximum impact and to locate where those capabilities are found. Job families can be used to set job requirements at the corporate level for similar jobs, to view potential matches and bridges for in-house mobility, to provide corporate learning opportunities, and to design structured career development programmes. At the OECD, each job falls under one of the three job families: Executive Leadership, Policy Research, Analysis and Advice, and Corporate Management and Administration. In each job families there are technical competencies that are specific for the given job.

In addition to this, there are the Core Competencies, important across all jobs and divided in three clusters: delivery-related competencies, interpersonal competencies, and strategic competencies. The remaining pages set out all fifteen of the competencies and the behaviors expected at different levels which reflect the variance in complexity, scope, and responsibility across jobs. Plus, the jobs typically associated²⁷.

Core competencies:

1. Delivery-related (blue):
 - Analytical Thinking
 - Achievement focus
 - Drafting skills
 - Flexible thinking
 - Managing Resources
 - Teamwork and Team leadership
2. Interpersonal (purple):
 - Client focus
 - Diplomatic sensitivity
 - Influencing
 - Negotiating
 - Organizational knowledge
3. Strategic (green):
 - Developing talent
 - Organizational alignment
 - Strategic networking
 - Strategic thinking

Each competency is defined and described at each level of the Core Competencies (from level 1 to 5) with behavioural indicators that highlight how an individual can demonstrate that competency. Each competence is divided by the three categories above – with an example below:

²⁷ https://www.oecd.org/careers/competency_framework_en.pdf

Key Indicators

Level 1

Each level of the Core Competencies has behavioural indicators that highlight how an individual can demonstrate that competency. Behavioural indicators are designed to show the requirements for successful performance.

Level 1 is typically associated with jobs such as Assistants, Secretaries and Operators.

Analytical Thinking

- ✓ Distinguishes between critical and irrelevant pieces of information.
- ✓ Gathers information from a variety of sources to reach a conclusion.

Achievement Focus

- ✓ Defines ambitious, but realistic, personal goals.
- ✓ Works while meeting quality and performance standards.
- ✓ Promptly and efficiently completes work assignments.

Drafting Skills

- ✓ Tailors communication (e.g. content, style and medium) to diverse audiences.
- ✓ Writes and presents factual material in a concise manner.

Flexible Thinking

- ✓ Proposes ways to do things differently.
- ✓ Understands and recognises the value of other points of view and ways of doing things.
- ✓ Displays a positive attitude in the face of ambiguity and change.

Managing Resources

- ✓ Organises the use of resources to meet expectations and identifies difficulties.
- ✓ Plans, coordinates and manages internal and external resources to accomplish assignments within the given deadlines.

Teamwork and Team Leadership

- ✓ Initiates collaboration with others and spontaneously assists others in the delivery of their work.
- ✓ Shares all relevant information with others and seeks others' input.
- ✓ Expresses own opinion while remaining factual and respectful.

Client Focus

- ✓ Responds to and anticipates client needs in a timely, professional, helpful and courteous manner, regardless of client attitude.
- ✓ Clearly shows clients that their perspectives are valued.
- ✓ Strives to consistently meet service standards.

Diplomatic Sensitivity

- ✓ Listens actively, considers people's concerns and adjusts own behaviour in a helpful manner.
- ✓ Understands the reason behind, or motivation for someone's actions.
- ✓ Is attentive when doing projects and assignments, or when interacting with people from different countries and backgrounds.
- ✓ Expresses negative feelings constructively.

Developing Talent

- ✓ Takes advantage of learning opportunities provided (e.g. courses, feedback from supervisor or peers) to meet requirements of current job.
- ✓ Sets clear self-development expectations.

Organisational Alignment

- ✓ Explains the role and goals of the Organisation and how they relate to own area of work.
- ✓ Is able to explain how own work relates to the work of the Organisation.

Influencing

- ✓ Checks own understanding of others' communication (e.g. paraphrases, asks questions).
- ✓ Maintains continuous, open and consistent communication with others.
- ✓ Builds on successful initiatives to gain support for ideas.
- ✓ Adapts arguments to others' needs/interests.

Negotiating

- ✓ Identifies main negotiating points of a given issue and engages in negotiation.
- ✓ Listens to differing points of view and promotes mutual understanding.

Organisational Knowledge

- ✓ Demonstrates understanding of the general environment in which the Organisation operates.
- ✓ Understands and uses the Organisation's structures, rules and networks.
- ✓ Knows and respects the Organisation's Code of Conduct and values.

Strategic Networking

- ✓ Actively nurtures both formal and informal contacts to facilitate the progress of work by proactively sharing information, best practices, respective interests and areas of expertise.
- ✓ Identifies current or past contacts that can provide work-related information or assistance.
- ✓ Fosters two-way trust in dealing with contacts (e.g. maintains confidentiality regarding sensitive information).

Strategic Thinking

- ✓ Identifies new information or data to key decision-makers or stakeholders to support their understanding and decisions.

4.3.4. SHRM professional HR competency model

This competency model is designed to serve as a resource for HR professionals interested in developing proficiency within each critical competency, from professionals just entering their HR career to those at the executive level. In other words, this competency model can assist the HR practitioner in developing a roadmap to achieve the organisation's HR goals. This competency model is intended to be used for developmental purposes only (selection decisions should not be based upon this model)²⁸.

The document presents a clear scheme. Initially are explained the background information, the Model Key, the characteristics of HR Professional Career Levels and the remaining pages explain the 9 competencies in detail.

For each competency the document provides an overall definition, sub-competencies associated with the primary competency, behaviours demonstrated by individuals highest in proficiency on that competency, and behavioural standards in which an HR professional at the relevant career stage should engage to be successful (following the scheme below).

²⁸https://www.shrm.org/learningandcareer/competency-model/publishingimages/pages/default/shrm%20competency%20model_detailed%20report_final_secured.pdf

KEY	
TITLE	<ul style="list-style-type: none"> This is the title of the competency
DEFINITION	<ul style="list-style-type: none"> This is the overall definition of the competency
SUB-COMPETENCIES	<ul style="list-style-type: none"> These are competencies related to and/or subsumed by the relevant general competency
BEHAVIORS	<ul style="list-style-type: none"> These are behaviors demonstrated by individuals at the highest level of proficiency on the indicated competency
PROFICIENCY STANDARDS	<ul style="list-style-type: none"> These are standards for proficiency at the four career stages (early, mid, senior, and executive). Each proficiency standard represents a Behavioral standards in which an HR professional at the relevant level should engage to be successful.

SHRM's Competency Model distinguishes between four different career levels: early, mid, senior, and executive level. Every career level is explained at the beginning of the document.

The competencies are distinguished in specific categories:

- Human Resource expertise
 - a. Strategic business management
 - b. Workforce Planning and Employment
 - c. Human Resource Development
 - d. Compensation and Benefits
 - e. Risk Management
 - f. Employee & Labour Relations
 - g. HR Technology
 - h. Global and International Human Resource Capabilities
 - i. Talent Management
 - j. Change Management
- Relationship management
 - a. Business Networking Expertise
 - b. Visibility
 - c. Customer Service (internal and external)
 - d. People Management
 - e. Advocacy
 - f. Negotiation and Conflict Management
 - g. Credibility
 - h. Community Relations
 - i. Transparency



- j. Proactivity
- k. Responsiveness
- l. Mentorship
- m. Influence
- n. Employee Engagement
- o. Teamwork
- p. Mutual Respect

- Consultation:
 - a. Coaching
 - b. Project Management (Vision, Design, Implementation, and Evaluation)
 - c. Analytic Reasoning
 - d. Problem-solving
 - e. Inquisitiveness
 - f. Creativity and Innovation
 - g. Flexibility
 - h. Respected Business Partner
 - i. Career Pathing/Talent
 - j. Management/People Management
 - k. Time Management

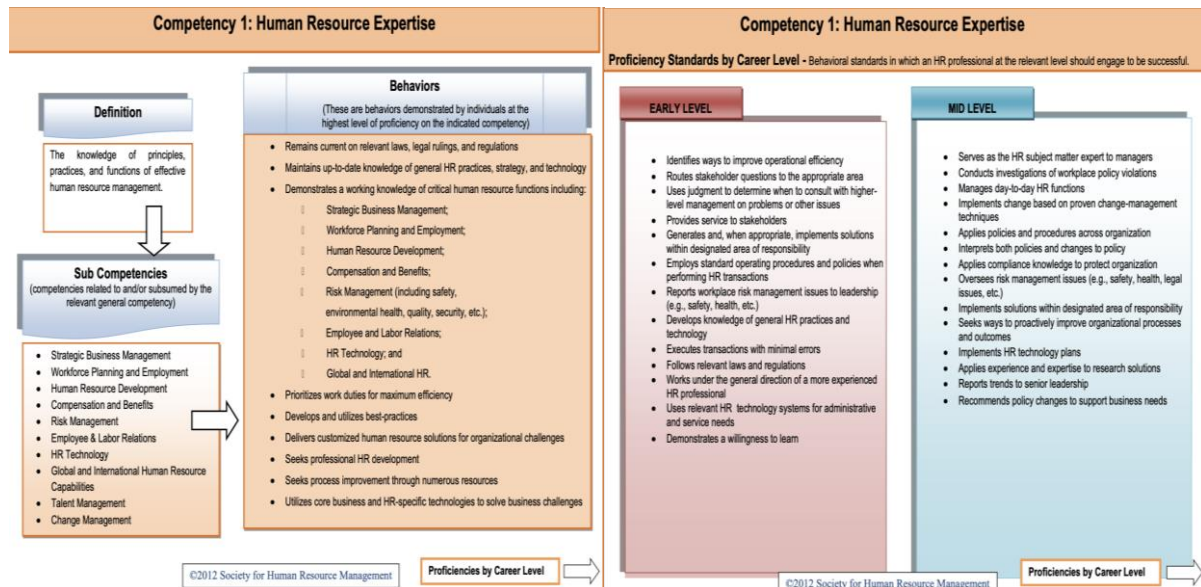
- Leadership & navigation:
 - a. Transformational and Functional Leadership
 - b. Results and Goal-Oriented
 - c. Resource Management
 - d. Succession Planning
 - e. Project Management
 - f. Mission Driven
 - g. Change Management
 - h. Political Savvy
 - i. Influence
 - j. Consensus Builder

- Communication:
 - a. Verbal Communication Skills
 - b. Written Communication Skills
 - c. Presentation Skills
 - d. Persuasion
 - e. Diplomacy
 - f. Perceptual Objectivity
 - g. Active Listening
 - h. Effective Timely Feedback
 - i. Facilitation Skills
 - j. Meeting Effectiveness
 - k. Social Technology and Social Media Savvy



- I. Public Relation
 - Global & cultural effectiveness:
 - a. Global Perspective
 - b. Diversity Perspective
 - c. Openness to Various Perspectives
 - d. Empathy
 - e. Openness to Experience
 - f. Tolerance for Ambiguity
 - g. Adaptability
 - h. Cultural Awareness and Respect
 - Ethical practice:
 - a. Rapport Building
 - b. Trust Building
 - c. Personal, Professional, and Behavioural Integrity
 - d. Professionalism
 - e. Credibility
 - f. Personal and Professional Courage
 - Critical evaluation:
 - a. Measurement and Assessment Skills
 - b. Objectivity
 - c. Critical Thinking
 - d. Problem Solving
 - e. Curiosity and Inquisitiveness
 - f. Research Methodology
 - g. Decision-making
 - h. Auditing Skills
 - i. Knowledge Management
 - Business acumen:
 - a. Strategic Agility
 - b. Business Knowledge
 - c. Systems Thinking
 - d. Economic Awareness
 - e. Effective Administration
 - f. Knowledge of Finance and Accounting
 - g. Knowledge of Sales and Marketing
 - h. Knowledge of Technology
 - i. Knowledge of Labour Markets
 - j. Knowledge of Business Operations/Logistics
 - k. Knowledge of Government and Regulatory Guidelines
 - l. HR and Organizational Metrics/Analytics/Business Indicators

An example of description of a competency is shown below:



4.3.5. Similarities and differences between the four examples

- Each document has a similar structure. In most cases we find a brief description of the division into categories of skills, followed by the definition of the skills, and finally the presentation of the real skills.
- The IAEA document explicitly states that these skills form an integral part of the selection criteria. The reverse is true for HRMS. Documents from the EU and the OECD say nothing about it.
- In the document of the OECD and of the European Union we find an initial glossary, not present in the documents of IAEA and SHRM.
- The documents of the IAEA and the EU are well structured, in fact they also have a section dedicated to how to use the competence framework. For the European one you can find also a section dedicated on how to modify the competencies framework based on the needs.
- The IAEA and SHRM document provide an in-depth definition of the roles, based on which competencies should be more / less in-depth.
- In the OECD and SHRM document, competences are explained based on a macro-classification into families (job families). While for the EU, the breakdown is based on the sector and institution of reference. Finally, the IAEA shows a pyramid structure of skills from a core valid for all to the specific competencies according to the specific job.
- The OECD document is the only one in which competences are explained through the document according to the reference level. The other documents explain the



competences one by one, within one can find the specific description according to the role of reference. The EU document shows the most structured classification.

- Each document is easy to read and to understand. The document by the EU is certainly the more complex because is composed by several annexes.
- According to the documents analyzed, the level of knowledge/belonging of a certain competence depends on the role held. For some (AIAE and SHRM) there is no subdivision in number, but a description of the skills to have according to the role; while the OECD and EU use a classification system based on a minimum level (1 for the OECD and 0 for the EU) up to a maximum level (5 for the OECD and 4 for the EU) based on the role covered.
- There are certain skills that show up in every document - sometimes with the same wording, others with different names; but the meaning is the same. These competences regard analytical thinking, a result-orientation, decision making, communication in various forms (written and verbal), leadership skills, negotiation and diplomacy skills, strategic and reasoned management of resources (monetary, time and workforce), flexibility and teamwork.

Here is provided a summary of the similarities and differences:

	OECD	IAEA	EU	SHRM
Overall aim of the document	Not present	Present	Present	Present
For selection purpose	N/D	Yes	N/D	No
Skill-level	Level from 1 to 5 depending on the role	Division by role	Level from 0 to 4 depending on the role and institution	Division by role
Glossary	Yes	No	Yes	No
Guide on how to use it	No	Yes	Yes	No
Categorization of competencies	Job families	Pyramid (Core value; Core competencies; Functional competencies)	Per sector / institution	Job families
Explanation of the competencies	By the level	By competence	By competence	By competence
Explanation of the level / role	Yes, but brief	Yes	Yes, accurate	Yes, accurate
Readability	Ok	Ok	Ok (Document + annexes)	Ok



4.4. Data gathering: Workshops.

Given the type of stakeholders and membership, EHPA organised stakeholder workshops through its members to gain feedback. This activity including two online workshops (via Zoom) that were conducted in May 2022 and June 2022. Consortium partners sharing the event registrations as well as participating and guiding the discussion. Note that EHPA, has conducted and tested these tools in several previous events, with the tools being deemed as suitable for the task.

4.4.1. Heat Pump skills and competencies: A comprehensive framework



Event presentation: The European Heat Pump Association has identified skills development and demands as being critical within the EU market if the target of more than 2 million heat pump (HP) installations per annum by 2024 is to be achieved. The HP market is predicted to double by 2023 across Europe, in Ireland alone, the National Climate Action Plan predicted 600,000 HPs to be installed by 2030. Many of these installations will be designed for and installed in residential or non-residential buildings. While significant efforts have been placed on up-skilling within the construction sector there has been limited specific focus on the HPs market and its value chain specifically. Given that HPs will transition to becoming a critical component of low energy and near zero energy buildings into the future the need to ensure that skills and knowledge on the supply side (manufacturers, designers, installers, commissioners, SMEs) plus the needs on the demand side (building owners, facility managers, property developers) is vital. HP4All addresses this need by aiming to analyse the barriers across the HP value chain segments to accurately identify measures, actions, and solutions to up-skill the value chain while also driving demand from end-users. Through the piloting of these approaches in countries with emerging HP markets, with support from technical and HP market expertise the lessons learned can be exploited and spread across Europe.

The HP4All project plans to improve and build upon the existing training and skills assets available in the European Union, using a threefold and self-reinforcing approach of:

- Firstly, to gather and analyse data coming directly from end users and training providers, coupled with Regional, National and European Union wide best training policy frameworks.

- Secondly, to find opportunities, barriers and gaps (e.g., quantitative, qualitative) in the current training offers and/or policy.

- To engage the relevant stakeholders (e.g., installers associations, installers, training providers) on how to up-skill their services and build upon the existing resources available.

The aim is to develop a Competency Framework for the range of knowledge, skills and expertise required to ensure that the relevant HP technologies are installed to the highest quality as to make the maximum contribution towards the energy transition.

This is a partner event of the European Vocational Skills Week - the annual Week celebrating all the very best practices in Vocational Education and Training (VET), welcoming events by local, regional, national organisations - and other VET partners.

EUROPEAN VOCATIONAL SKILLS WEEK 2022

Agenda (Event link: <https://app.ehpa.org/#/event-details:59>):

Welcome and introduction to the event by Dan Stefanica (EHPA)

Introductory remarks by Luca Angelino (EU Commission)

Introduction to the HP4All project by Padraic O'Reilly (TUS)

Short presentations and Panel discussion Moderated by Dan Stefanica (EHPA) with:

- Julie Beauflis: Secretary General at EuropeOn – the European Association of Electrical Contractors
- Jan Cromwijk: Project Coordinator at ISSO
- Carlos García Delgado: Technical specialist on construction and civil engineering at CTA
- Thomas Nowak: Secretary General - the European Heat Pump Association (EHPA)

Brief presentation on the HP4All Competency Framework by Dan Stefanica (EHPA)

Closing of event by Dan Stefanica (EHPA)

Event Description: The “Heat Pump skills and competencies: A comprehensive framework” was organized by EHPA and HP4All on Wednesday, 4th of May 2022. The event fits perfectly into the geopolitical events that are happening in Europe and are pushing more and more towards an energy transition and zero-net buildings. However, this implies providing customers with the best possible service, through an upscaling and improvement of skills.

Dan Stefanica (EHPA) opened the webinar, welcoming attendees and introducing the event. He also provided an overview of the HP4All project. Furthermore, he recalled how this event fits into the European Vocational Skills Week. This week aims to celebrate best practices in vocational education and training (VET) by hosting events from local, regional, national organizations and other VET partners.



The event continued with the intervention of Luca Angelino (EU Commission), who underlined the appropriate timing of the event for several reasons. Firstly, the profound climate crisis that the EU is facing in multiple ways and which it has already partially addressed with political solutions, such as the EU Green Deal or the Fit for 55 package. The second crisis is the increase in energy prices, which is going to hit the business sector and people. Finally, the geopolitical crisis, due to dependence on fossil fuels and the high rate of foreign gas imports. The Heat Pumps (HPs) therefore present themselves as key solutions to address these crises. The goal is to install 10 billion units of HP over the next 5 years. To do this it is necessary to retrain the workforce. Luca concluded his speech with an overview of the HP4All project, which allows to face all the barriers of the HP market both in terms of supply and demand.

Padraic O'Reilly began his speech by emphasizing the importance of the HP4All project at this historic moment as to achieve the set goals, it is important to have a reliable tool when installing, e.g., the HP4All tools, including benchmarking tools that will be important for the 3 pilot regions. The project certainly faced some difficulties due to the pandemic situation, but its strong point is that all the partners involved are bringing experiences from different countries to the table. The project is addressed to who are already in the sector, bringing them more knowledge about new technologies.

Later Dan introduced the round table, with short presentations of the speakers. It started with Julie Beaufils (EuropeOn).



One of the major problems identified in HP4All was the need for highly skilled installers. The EuropeOn's [#Skills4Climate](#) campaign addresses this issue. Launched in November 2019 as part of the EU Green Deal, it provides for the electrification and deployment of renewable energy. The lack of skilled workers leads to 8000 vacancies in the field of electrical consultancy. There is therefore a technical challenge, because we need a rapid launch of clean technologies, but also, a challenge of the workforce due to the lack of people in the sector. Resolving skills and the shortage of professionals is a global problem that needs a holistic solution, which also involves policy makers and stakeholders. Examples of awareness raising initiatives carried out in Germany, France, Finland, the Netherlands, Austria has been explained.

Finally, Julie presented the letter written by EuropeOn to the European Commission, which contained all these issues (available [here](#)). This letter, strongly supported by the EHPA, has achieved a record of associations signatories. The key topics touched upon

in the letter are:

1. Require Member States to fill the gap between available installation professionals and those needed to achieve EU climate and energy targets.
2. Launch an ambitious EU campaign to change mindsets across Europe by making it more accessible to women as well and by encouraging Member States to tailor their own campaigns.
3. Bring together Member States, social partners, academia and all EU and national stakeholders in a "Skills4Climate / Climate crafters platform".

Dan presented Jan Cromwijk (ISSO), who stressed the importance of activity-based learning outcomes in order to stimulate demand and be able to meet it.



The need to learn these skills lies in rapid improvement, to solve cross craft issues where many components of the installation must be in proper shape, to place on the market truly qualified workers, and to enable microlearning. The field of learning is changing rapidly, so task-based Unit of Learning Outcomes (ULOs) are needed. ULOs are defined in terms of knowledge, skills, and responsibilities. Jan then explained how the ULO BUSLeague system works. He concluded his speech by underlining the importance of putting HP in motion, involving installers to speed up to face the many needs of end users.

Dan Stefanica presented then Carlos Garcia Delgado (CTA), who provided insights into the HP4ALL project in Andalucía, southern Spain. In the case of Andalusia there is a clear need for a geothermal system and domestic hot water.



Then, he presented the measures put in place to promote HP applications, such as the one made by the *Asociación de Fabricantes de Equipos de Climatización*, the *Instituto Nacional de las Cualificaciones*, and by the *Agencia Andaluza de la Energía*. Finally, Carlos underlined the great effort made so far for dissemination and communication by both producers and utilities,



even if often aimed at a high-level audience. He pointed out also some points to be improved, such as the permanent VET training, the HP visibility in the qualification framework, and more awareness of the usefulness of installing HP in the construction sector. The next steps are therefore to further develop the key role of administration, promote dialogue between VET organizations, educators, training courses and solution providers and involve the consumer organization and social media stakeholders.

Dan presented Thomas Nowak (EHPA), who underlined that this is the right time to stimulate interest in heat pumps. In fact, there are 100,000 FTEs in Europe, thanks to the REPowerEU the commission aims to double sales by 2025 and to date EHPA is trying to reach 2.1 million heat pumps sold.



The fundamental question posed by Thomas, however, is how to make redevelopment to become heat pump installers more interesting for boiler installers. As for member steps, job descriptions and engineering, technical, and coding skills are required.

At a European level, the following are certainly important:

- RED III, which from the beginning faced the lack of skills.
- EHPA has suggested to the European Commission to organize an EU summit on skills retraining.
- Make the cleaner solution the economically more attractive one. This will attract the attention of entrepreneurs and increase the number of installers and new players and promote the creation of new business models.

The event then continued with a lively discussion starting from the questions of the public. Thomas stressed the need to double the number of FTEs present to date and to make these needs felt also by the European Commission. This has been pointed out also by Julie. Indeed, the European Commission should be used as a pressure measure to incentivize member states to use HP and achieve an energy transition. Based on a question received from the audience, Jan explained the value of task-based learning outcomes. In fact, HP's technologies are developing very fast, using them it is possible to identify a development and publish a short retraining course, which can be immediately applied and recognized.

Finally, each speaker considered the most important skills / competences needed in the HP sector. Soft skills, customer orientation, the importance of proper maintenance, understanding of crosscraft and the ability to make it palatable in the market were mentioned. But even more the importance of proper maintenance, which requires profiles with high skills.



The event ended with a brief presentation by Dan Stefanica on the analysis of the HP4All skills framework, which will be concluded in a few months. Dan explained the sources on which the framework analysis is based, such as BUSLeague, CraftEdu, The NZEB roadshow. HP4All is organizing workshops in the coming months with real HP manufacturers to explain their work in terms of training.

Lastly, Dan Stefanica encourages attendees to subscribe to our newsletter and thanks the audience for participating.

Participants

127 registrations and 100 attendees

Recording of the event available [here](#).

4.4.2. Training programmes offered by Heat Pump producers: Installers and manufacturing personnel as the backbone of the heating transition



Event presentation: The European Heat Pump Association has identified skills development and demands as being critical within the EU market if the target of the REPowerEU of 2 million heat pumps/year in the next 5 years, reaching a total of 30 million new installations by 2030 can be achieved. With its 1.8 million direct and indirect jobs, the European heating industry is a force for innovation and local value creation and a continues source for re-skilling and up-skilling of world leading professionals.

Given that heat pumps are becoming a critical component for energy security and sustainability, the need to ensure that skills and knowledge on the supply side (manufacturers, designers, installers, commissioners, SMEs) plus the needs on the demand side (building owners, facility managers, property developers) is vital. HP4All addresses this need by aiming to analyse the barriers across the heat pump value chain segments to accurately identify measures, actions, and solutions to up-skill the value chain while also driving demand from end-users. Through the piloting of these approaches in countries with emerging heat pump markets, combined with support from technical and HP market expertise the lessons learned can be exploited and spread across Europe.



As such, it becomes quite relevant to look at already running or planned training programmes offered by heat pump manufacturers and associations, while recognising their value and replication potential, with the event presenting a small part of the initiatives that are making a serious change in their countries and at EU level.

Agenda (Event link: <https://app.ehpa.org/#/event-details:64>)

Welcome and introduction to the event by Dan Stefanica: Head of EU Projects at EHPA
Keynote speech by Katja Weinhold: Spokesperson & Head of Communication at the Federal Heat Pump Association (Bundesverband Wärmepumpe (BWP)).
Short presentations and Panel discussion Moderated by Dan Stefanica (EHPA) with:

- Adrian Solla: Sales Manager at Ecoforest Geothermia
- Hervé Pierret: Section Manager Sales, Strategy & Marketing Heating & Renewables SBU at Daikin Europe N.V.
- Leonie Assheuer: EU Affairs Manager at the Viessmann Group
- Albert Blasco: Marketing Manager Panasonic Heating & Cooling Solutions Europe

Closing remarks by Dan Stefanica (EHPA)

Event Description: The “Training programmes offered by Heat Pump producers: installers and manufacturing personnel as the backbone of the heating transition” was organized by EHPA and HP4All on Wednesday, 6th of July 2022.

Dan Stefanica (EHPA) opened the webinar, welcoming attendees and introducing the event. This event is the second in a series of HP4All project events. Through a threefold and self-reinforcing approach, it aims to develop a Competency Framework for the range of knowledge, skills, and expertise required to ensure that the relevant HP technologies are installed to the highest quality as to make the maximum contribution towards the energy transition.



The event continued with the intervention of Katja Weinhold (BWP), who presented the HP ramp up in Germany. She provided an overview of the German Heat Pump Association (distribution of BWP members across the value chain and the key activities). Then, she showed the current situation through market figures regarding HPs in Germany:

- Sales figures in 2021

- Sales development Q1 2022 compared to Q1 2021
- HP in the new building vs renovation sector
- Total market for heat generators 2021 (HPs, Biomass, Gas, and Oil)
- BEG (Federal Funding for efficient buildings)

She also provided an overview of the politics in this field and the remaining challenges, regarding moreover the installation, HP-specialist and craftsmen capacities. Then, she presented some suggestions and ideas on how to create “Heroes of the Energy Transition”. Finally, she explained the current programmes and short-term measures to overcome the challenges explained before, such as the HP online training and the VDI 4645-1 Directive.



Adrian Solla (Ecoforest) showed the work done by the Ecoforest Academy on the renewable HVAC systems about the origin, why is it necessary, and how they do it. These training courses resulted in trained professionals for installation, commissioning, maintenance and after sales

service. Indeed, the Ecoforest Academy tries to cover the demand of trained professionals with various training courses oriented to different areas and professionals by creating also joint programmes between governments, associations, certification bodies and manufacturers.



Later Dan introduced Hervé Pierret (Daikin Europe N.V.), who provided the Daikin's view on training and supporting installers of HPs. Firstly, he presented Daikin in Europe, the European Development Center (EDC) created in 2012, and the Daikin's Plan European Operation Network. He also presented two training and support program:

- The Training Academy (approach, goals and objectives, range of courses, and the UK example)
- The Online support platform: Stand by me (also the E-Care app)

Hervé stressed the importance of HPs installers to decarbonize the heating sector.



Leonie Assheuer (Viessman Group) presented the current training programs that Viessman Group is carrying on. After having shown the 5S for a successful HP wave “made in EU” (Speed, customer Satisfaction, Scale and Sustainability), Leonie stressed the importance of

investing in trained installers. Viessman organized an in-house learning center to pool training & re-skilling classes, and Leonie explained the main pillars:

- Level up: increase training capabilities, focus and multi-channel strategy
- Be pragmatic (taking Mohammed to the Mountain, services & tools, and compensation)
- Be people centric (dispel fears via ‘beginner trainings’, personalized training, and young talent initiatives)



Albert Blasco (Panasonic) reminded how the knowledge, the number of professional installers and the market penetration of HPs is different by countries. He underlined the necessity to increase HP professionals through the conversion of boiler professionals and new professionals HP native. So, he briefly presented:

- How the training journey to A2W Professional differs for each professional background
- Key contents as manufactures can contribute
- How to maximize the reach through max capillarity
- Educational transition



Then, the event continued with a lively discussion starting with questions from Dan Stefanica.

Katja pointed out that, apart from what already mentioned in her presentation, a new job profile would be useful to increase the number of HP personnel. Albert said that the main demanded training by Panasonic is the one related to connectivity. Moreover, he underlined the importance of digitalization in the training for many reasons (such as online training, the possibility to engage people wherever and whenever they are available, and so on). In a nutshell, Hervé pointed out the main elements that can make easier for non-installer to become HPs installer:

- Next to the performance requirement of HPs, it is important to take into consideration both the installation and the maintenance aspects

- Make sure the units are (online) connected
- Management aspect: easily keep track the maintenance

Regarding this, Adrian added some other factors, such as the face-to-face learning process and an online platform more interactive. One problem is the lack of time, so Panasonic is trying to manage this challenge and involve more people in the training courses (moreover students). Finally, Leonie explained the discussion that happened recently in Germany regarding the HP sector. As far as she knows there is not specific agreement, but a firm commitment to improve training and make them more efficient.

The event ended with a brief presentation on the HP4All Competency Framework, which is already a work in progress. The project is collecting data from likeminded projects, national associations, input from other project deliverables, and so on.

Lastly, Dan Stefanica encourages attendees to subscribe to our newsletter, follow EHPA events, and thanks the audience for participating.

Participants

161 registrations and 91 attendees

Recording of the event available [here](#).



4.5. Data gathering: Project website & survey.

Supporting the previous work, and due to updated circumstances (health, economic, value chain disruptions, new political targets) and additional data gathering survey was made available to stakeholders via the project website, and at Industry trade fairs/conferences (chapter 4.6). The results of the updated survey can be found below (along with the templates used). The Survey administered by the HP4All consortium led to the following results, based on the responses of twenty participants.

4.5.1. Profile of the respondents

Having the possibility to put multiple answers, the respondents (20) describe their job position as follows:

- o The majority of them work within the sphere of research (6) and planning/design (6)
- o Manufacturing staff (5) and energy company staff (5)
- o Installation staff both in the non-residential sectors (3) and in the residential sector (3)
- o Distribution in the non-residential sectors (2), and maintenance and operation staff (2)

It is interesting to note that no respondents were belonging to the distribution staff groups in the residential sector and the public sectors.

Other activities in which they take part are:

- o Establishing business partners partnership (10)
- o Meeting new clients (8)
- o Marketing (7) and liaising with suppliers (7)
- o Hardware / Software implementation (6), liaising with sectorial associations (6), and liaising with local government (6)
- o Financial management (5)
- o Human Resources / Recruitment (4)
- o Liaising with start-ups / new technologies providers in the sector, and other (1)

The participants then gave a value of importance to each of the activities listed above. As can be seen from the image below (Fig. 1), meeting new clients and establishing business partnerships are seen as the most essential by 33% of respondents. Liaising with suppliers is instead the activity that is considered important, but not essential by 52% of respondents. Going to scale, liaising with sectorial associations is seen by 52% with average importance. Finally, the activities seen as less important by the 4% of the participants are meeting new clients, hardware/software implementations, establishing new partnerships and liaising with sectorial associations.

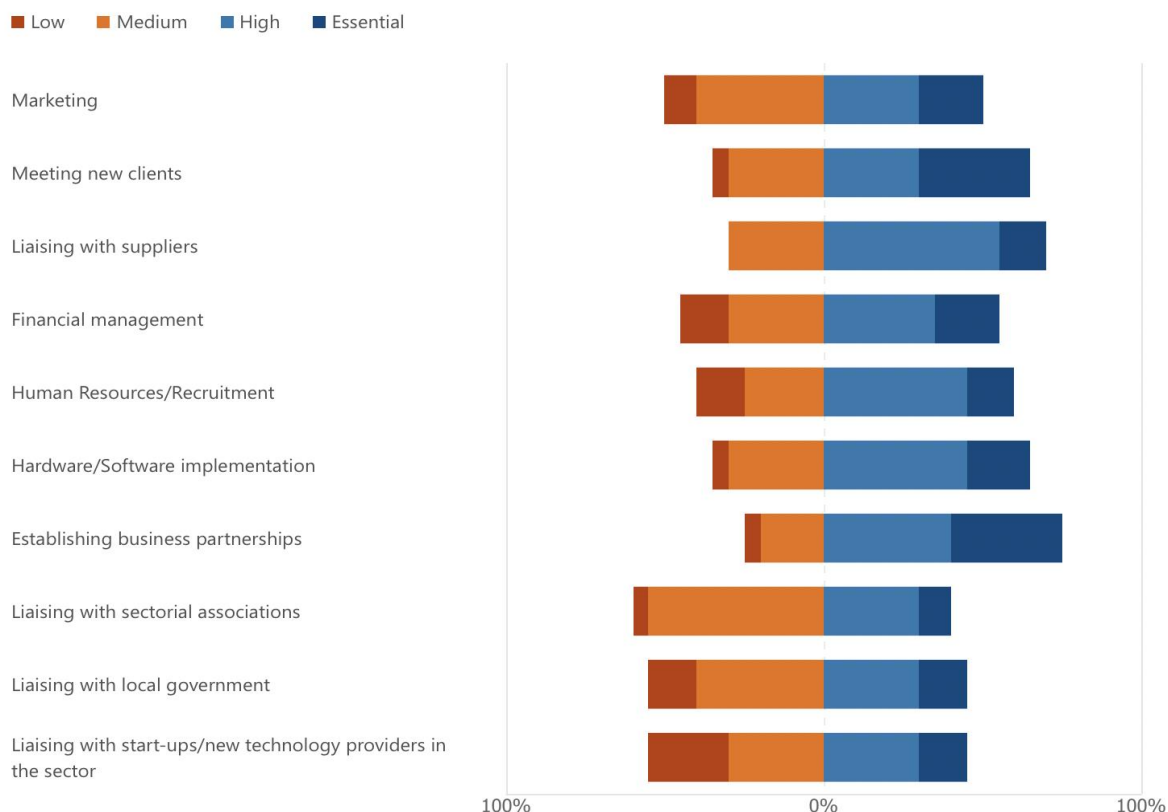


Figure 4.5.1.1 - How would you rate the importance of each activities for your organisation?

4.5.2. Profile of the companies

Most of the companies involved operate on a local (7), national (7) and international scale (7); followed by regional (6) and, to a lesser extent, European actions (4).

The countries in which the respondents operate are different, concentrated more in Europe.

In particular:

- o The majority operate in Central Europe: Albania, Romania, Serbia, Bosnia and Herzegovina, Montenegro, Macedonia, Greece
- o In Western Europe: Austria, France, Germany, Italy, Netherlands, and Switzerland
- o Finally, in Northern Europe: Ireland, Norway, Sweden
- o Some companies operate outside of Europe, such as in Kenya, East Africa and Guatemala, Central America

Most companies have a size workforce from 1 to 10 (7) and from 10 to 50 (7); in the second position there are from 50 to 500 (3) and from 500 to 1000 (3); only one has 1.000 and more.

Most of the companies, as described by the respondents, have the following main missions:

- o Planning/design (8)
- o Research (7) and manufacturing (7)
- o Installation in the non-residential sector (5), and maintenance and operation (5)



- o Distribution with a focus on the non-residential sectors (4), installation in the residential sector (4) and energy company staff (4)
 - o Distribution with a focus on the residential sector (2)
- Interesting to notice that there are no companies related to public body staff.
The 'other' section has three answers regarding the mission, they refer to the optimisation of renewables with heat pumps, education, and consultancy on energy reduction.

4.5.3. Profile of the heat pump technology and production

Considering that respondents could opt for more response options, the ranking of the most installed, built and developed type of heat pump is as follows:

Air (13)

Water (12)

Geothermal (8)

Hybrid (7)

Other (6): recovery of wasted energy, steam production, and industrial heat pumps

According to the survey, most of the respondents can assess the demand level of the heat pump market in the geographical area in which they operate, with a 4.30 out of 5 average ranking.

Out of 16 respondents, 7 predict growth in the heat pump sector. Some link it to increased government aid to promote the installation of renewable energy systems (such as solar, insulation, deep retrofits, and heat pumps); others to a growing demand, which will also ask for a combination of solar thermal and heat pumps. An interesting answer on the motivation for this growth is related to the fact that it will be driven not so much by the owners, but by the future increase in the price of energy. Some have also pointed out that the lack of labourers and the delay in the delivery of components could be braking factors.

4.5.4. Profile of the heat pump-related competencies

As can be seen from the photo below (Fig. 2), 19% of respondents believe that the quality and availability of technical skills is 'great' and 28% that it is satisfactory; followed by 23% for business, and health and security competencies. The factors that can be improved are those related to health and safety, and to business competencies, respectively 52% and 47% in fact believe that they are average. The skills to be absolutely improved according to 14% of the respondents are the skills related to the customer and organisational ones. In general, however, all the competence proposals have a large margin for improvement.

Regarding the quality and availability of heat pump-specialized workforce in their geographical operating area, 8 people gave us further information. Some of them pointed out that there is a lack of specialized professionals, for example also to be able to speak with clients who have little or no knowledge on the subject. An underlined challenge is finding people who can interface existing processes with the new cycles of combined functionality and increased efficiency. For others, the coverage of the installers is good enough for now, as is the coverage of the designers. This is also due to the work carried out by university mechanical institutes, which are expanding their offer of courses also on heat pumps, solar and renewable energy.

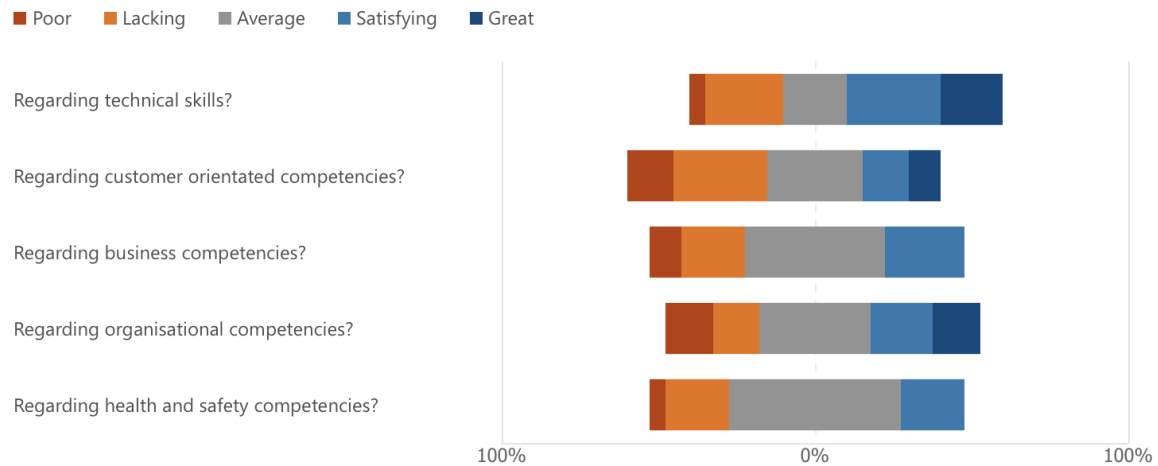


Figure 4.5.1.2 - Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area?

Regarding the skills and abilities considered essential in a scenario of growth in demand for the services offered by the company (Fig. 3), the respondents are divided exactly in half and agree both on the extreme importance of technical skills and customer-oriented ones.

In second place in importance are the skills related to business (28%), organizational skills (19%), and finally skills related to health and safety (9%).

The competencies, on the other hand, considered moderately continue exactly in the opposite way compared to before. Therefore, we find in the first place the skills related to health and safety (57%), organizational (47%), business (42%), and on a par with the technical and customer-oriented ones (23%).

About this topic, 6 people provided more information. Some stressed the importance of improving the skills of the workforce to improve retrofit results. This can be done not by stopping at installation, but also by monitoring the planning, installation, commissioning, and operation of works. Moreover, in some regions, heat pumps are not yet that popular, so it is vital to work to broaden awareness and the benefits of implementing heat pumps. In addition to this, awareness must be raised that an increase in energy efficiency is even more profitable

than an increase in market share.

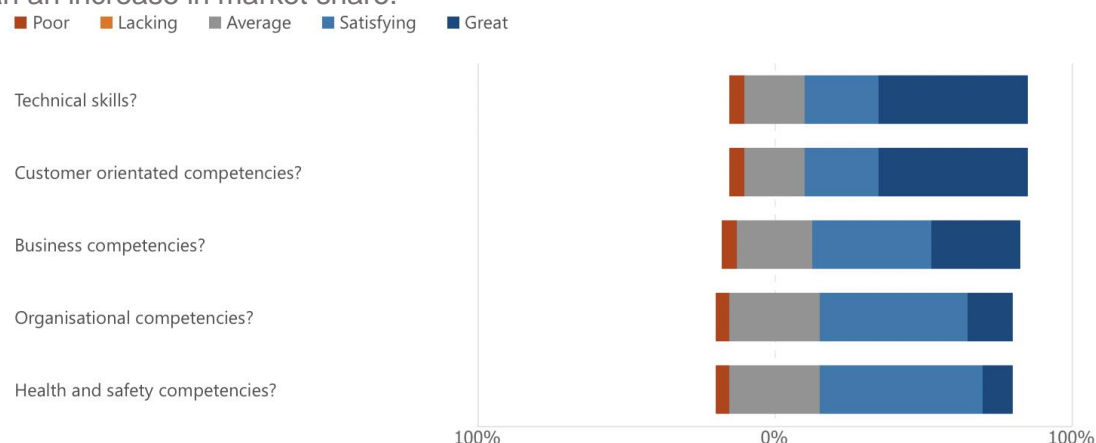




Figure 4.5.1.3 - What competencies and skills would you consider essential in a scenario of raising demand of your services?

If the company was using a trainer or training institute for its heat pump activities, it was asked to optionally assess its impact. From the answers (4) (Fig. 4) it can be seen that the greatest impact is on technical skills (33%), and then organizational skills (21%). According to 35%, a satisfactory impact was had on competencies in health and safety. Then, 28% agree on a good level of customer-oriented skills and business skills.

On this issue 5 people gave more explanations, agreeing on the importance of the training. The subjects on which they focused the most were retrofits, renewable energy installations, and heat pumps. Only one stressed the difficulty of finding trainees on this issue.

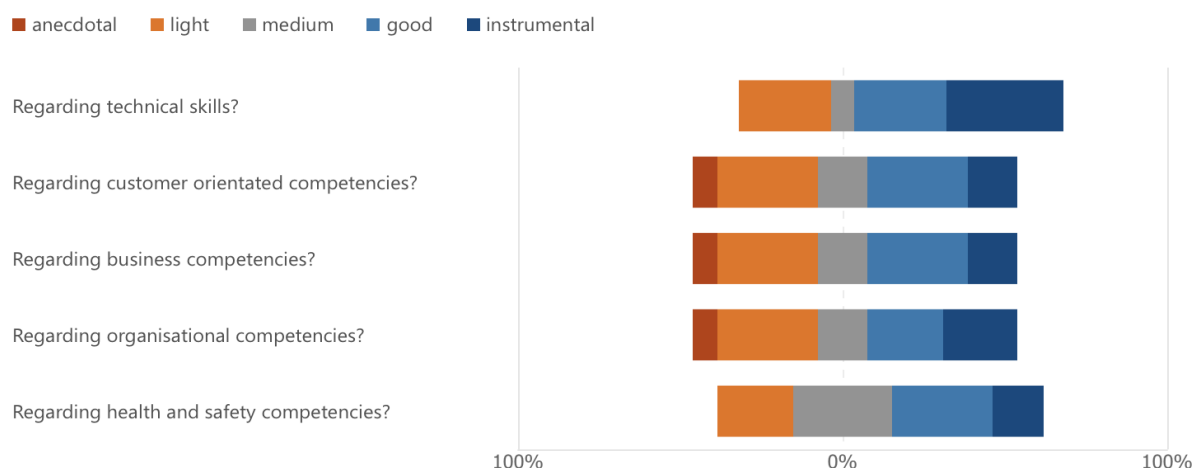


Figure 4.5.1.4 - If you are using a trainer(s) or training institution(s) regarding your heat pump activities, please could you rate the impact of your associations with this trainer(s) or training institution(s) on your activity?

Regarding training, the respondents expressed their assessment of the difficulty level of training their workforce in their geographical area of operation - as can be seen from the graph below (Fig. 5). Most of them (14%) think that organizational and technical skills are the most difficult to teach; the second tied are those relating to health and safety, and those relating to the customer. Those 'satisfactory' are the technical skills, according to 38% of respondents. Between 52% and 47% believe that organizational and customer-oriented difficulties, respectively, have an average difficulty.

Further information regarding issues related to the training, competencies and skills of heat pump-specialized workforce in their geographical operating area has been given by 4 respondents. The common idea is that improving the skills of professionals is critical to the success of renewable retrofit projects. Clearly, this process is not linear and involves many factors that should not be underestimated. But then the opinions change about the ways of implementing the training. One respondent recommended training during working hours and that employers pay their wages for not attending evening classes. Another emphasized instead that formation is not to be considered as a job but as a vocation.

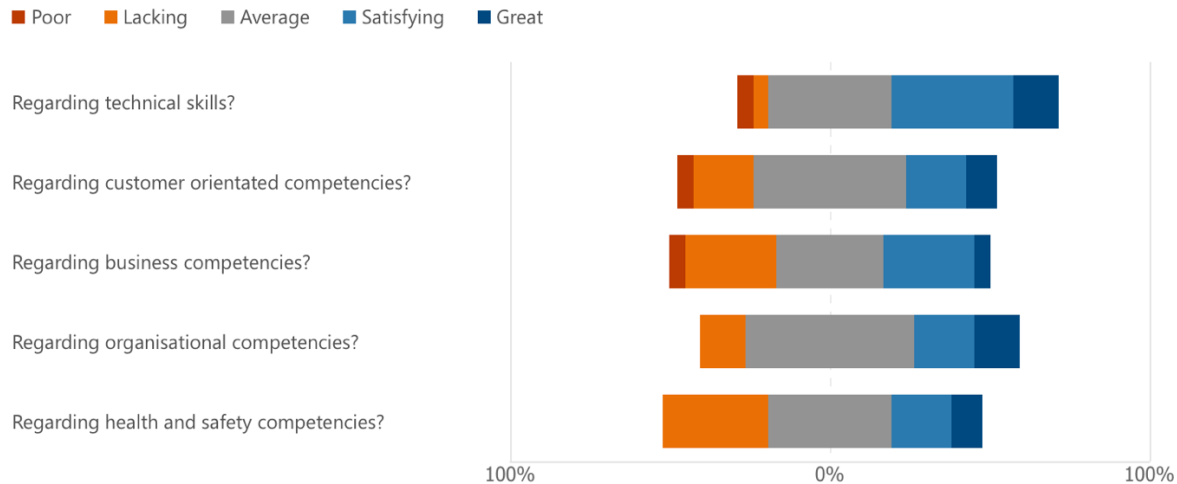


Figure 4.5.1.5 - Please could you evaluate the level of difficulty of training your workforce in your geographical operating area?

Concerning the topic of education, respondents were asked to provide opinions on the public education/certification programs available in their geographic operating area. According to about ten respondents, these are not required, do not exist or are not so specific; one person pointed out an increase in these certifications in recent years; for the remaining ones these certifications or training courses are present and accessible.

Another important factor is how public authorities support qualification and training policies. For this reason, with a non-compulsory question, the interviewees (13) were asked to highlight the political and/or legal barriers that hinder the training of personnel specialized in heat pumps in their geographical area.

Some people have pointed out that public authorities are not supporting qualification and/or training policies, mainly due to a lack of interest in the topic. Also, as one respondent replied, in some cases of installation of heat pumps or refrigeration equipment no qualified technicians are required - only a few (large) heat pump manufacturers have such requirements. Others have pointed out that the ministry should be the main promulgator, being one of the main institutions. This would certainly help speed up participation in the courses. According to one respondent, this should not be the task of public entities.

According to the opinion of 8 respondents, whose organization operates in several countries, the level of difficulty with the compatibility of training/certification of the workforce specialized in heat pumps in the different geographical areas involved is about 3.75 out of 5. Three (3) people have provided some more information on this aspect.

One person said that because he operates in countries where the situation regarding heat pump awareness is more or less the same, they have no problem. But it will probably be a challenge to enter the European Union market. Another, however, stressed that there is an awareness that an increase in energy efficiency is even more profitable than an increase in market share. However, this aspect is still non-existent in established industries.

One of the last questions concerned the current and future evolution of national policies (and European if the organization is active in different countries/regions) and the main challenges for policymakers related to training and upgrading the skills of the skilled workforce in heat pumps. Opinions varied.



Heat pumps require electricity to operate, so this electricity needs to be generated from renewable energy sources. It is certainly important to increase or create financing and know-how, which follow the growing trend of the market for these types of technologies. About this, it was underlined that for now, the main promoters of training are companies that need to expand their staff in 90% of cases. The Ministry and the state institutions still do not recognize its great importance, so the task falls on the companies.

Other issues underlined were:

- Carry out a life cycle analysis
- Create international standards and education recognized in all countries
- The importance of the discussion around flammable refrigerants
- Make these speeches understandable for less technical people, also defining different levels of training
- State subsidies for consumers

Finally, respondents were asked to share any recommendations for future policy changes regarding the training of heat pump specialists:

- After-sales monitoring of the systems to ensure efficient system operation.
- The installation must be optimized over time for the specific site.
- Involvement of States less involved in this process
- Training for both customers and installers
- A coherent package of measures at the European level, including best practice rules
- Addressing environmental problems, eg. groundwater treatment
- Technical schools to add such training courses to their work schedule. If not, large heat pump manufacturers could invest in setting up such schools
- Raise awareness that an increase in energy efficiency is even more profitable than an increase in market share
- Financial aid for training courses
- Clear collaboration between heating and refrigeration technology
- Make these topics understandable for less technical people by defining different levels of training



4.6. Data gathering: Other relevant events (e.g., EHPA annual Forum, the Heat Pump Summit)

EHPA will present the Draft Framework and key points at events targeted at stakeholders in the field, some examples of such events below:

Name of the event	Link to website
Mostra Convegno Expocomfort	https://www.mcexpocomfort.it/en-gb.html
EU Sustainable Energy Week EUSEW	https://eusew.eu/
European Heat Pump Summit	https://www.hp-summit.de/
Chillventa	https://www.chillventa.de/
ISH	https://ish.messefrankfurt.com/frankfurt/de.html
Sustainable Places	https://www.sustainableplaces.eu/

4.7. Data gathering: Interviews

LIT, ESV and CTA will engage with their National HP Expert Group to gain feedback and consideration on the framework. In addition, input will be sought from Observer Regions. This will be done with the aid of interviews based on pre-determined and agreed upon templates. The interview tool, being used as it suitably complements the other tools employed, while gathering a more in-depth set of inputs and expert (usually from experience) feedback. The interviews taking place at the same time as other data gathering methods (M16-M20). Additionally, interviewees from Observer regions, would make suitable interview candidates and offer an extended view, based on the circumstances of their particular region as well as its particularities that a competency framework should include. All interviews in their original template are added as annexes to this document.

As such, three interviews were provided by CTA, covering the National level mainly, but also extending to an international reach. They covered small organisations (10-50 staff), up to medium of almost 500 staff. The fields covered were those of manufacturing, installation, and maintenance/operation. Other organisational activities were mainly: Marketing, Meeting with clients, liaising with suppliers, Human Resources/Recruitment, Establishing business partnerships, Liaising with sectorial associations and Liaising with local government. The activities that were considered essential were: Marketing, Meeting new clients, Human Resources/Recruitment, as well as Liaising with sectorial associations and the local government. All three organisations were involved in the installation process of HPs with one also in the manufacturing and the other two in the day-to-day maintenance and operation of the system. All three responders dealt with all types of HPs (Air, Geothermal, Water, Hybrid). All three responders indicated that in the last three years, there has been an enormous growth in the sector (30%), that has made recruitment quite difficult, especially with the added need for updated type of trainings given the new technological advances. A trend that will continue due to the digital transformation required in the way staff operates. All three responders indicated that they offer training courses at different levels as to keep up with the ever-evolving demands of the sector. Regarding competences needed, it was indicated that the in-house



training regime must be complemented by external actors, as some competencies (e.g., sales, business) cannot be realistically taught internally to the standard that is required, this being made even more difficult by the public training schemes that are considered outdated or too lengthy.

On the policy/legal barriers, the respondents indicated that more financial support to practical schemes is needed as the public system is currently too bureaucratic and lengthy. An issue present not only in Spain, but in the EU as a whole: lack of staff and youth vocation with less developed countries and emerging economies having better perceived apprenticeship schemes.

On the opinions of the current and future evolution of national (and European if the entity is active in several countries/regions) policies related to the training and upskilling of Heat Pump-specialised workforce, the respondents pointed towards the need for more HP specialised policies as well as more targeted supporting schemes. Additionally, more practical apprenticeship courses overseen by industry combined with recruitment incentives linked to proven course goals achievement, specialised benchmarks, and more financial support to dedicated training schemes and more visibility of the labour opportunities that building energy renovation and HP may provide were highlighted as challenges for policy makers to address. On the recommendations for future policy changes regarding Heat Pump-specialised workforce training, the respondents indicated: More intensive financial support and setting up and financial support of combined administration and industry driven training competence centres; A framework action plan is urgently needed, combining training financial support, hands-on training schemes and labour force promotion measures, including aid to incorporate apprentices and external support during the period of practice; Hands-on training recruitment support measures.

For Ireland, TUS provided one interview as due to unforeseen circumstances, the additional interviewee ultimately declined the invitation. In Ireland there are 2 main pathways for HP installations to occur in Ireland, either through the SEAI grant funded scheme or not through the grant scheme. Outside of the grant scheme installers and contractors must follow building regulations which give minimum energy requirements for new builds and deep renovations, however there is no requirement for certification like in the grant process.

SEAI Grant Process

The grant process only applies to retrofitted residential housing. In order to apply for a heat pump, grant you must first ensure your house is heat pump ready. This is done through what is known as an HLI (heat loss indicator). If the house does not meet the required HLI of below 2.3 then they will not be allowed to apply for grant funding for a heat pump. To install a heat pump in Ireland and receive grant funding from the Sustainable Energy Authority Ireland (SEAI), the personnel nominated to sign off the Declaration of Works must have the following qualifications and training:

1. FETAC/QQI Level 6 Advanced Craft in Plumbing, including a module on minor electrical works, or equivalent.
2. Certificate of competence from the specific manufacturer of the heat pumps installed, based on an adequate training programme.
3. FETAC/QQI Level 6 Heat Pump Systems (Course Code C30263) and supplemental Domestic Heat Pump Installation (Code 700606) or equivalent.



For any electrical works on site a 'Registered Electrical Contractor' (REC) is required to supervise and sign off the electrical installation of a heat pump system, in accordance with the definition of "Controlled Works and Restricted Works" by the CRU. A copy of the REC certificate must be left with the homeowner and available for inspection. RECs must appoint and keep appointed at all times:

1. a Principal Duty Holder, and
2. at least one Qualified Certifier.

A person can be both a Principal Duty Holder and a Qualified Certifier. If a REC fails to maintain the status of his/her named QC, the REC will be removed from the Safe Electric register within 10 weeks. The REC's named QC must submit a copy of his Electrical National Craft Certificate or another suitable award, equivalent to Level 6 or higher on the National Framework of Qualifications and a copy of his personal Electrical Verification & Certification course subject to renewal every five years.

An F-Gas engineer is required to carry out and certify heat pump system installations involving refrigerant pipework and charging as per the F-Gas Regulation.

QQI (Quality and Qualifications Ireland) and FETAC (Further Education and Training Awards Council) are the 2 recognised qualification-awarding bodies.

The interviewee represents a national training provider, that also considers marketing and liaising with suppliers to be part of their business case. They deal mainly with Air, Geothermal and Water based HP systems, as well as exhaust air HPs. They consider that there is limited demand for training at present however there is a huge demand for heat pumps. This may be due to the new build targets by the government or lack of installers using the grant. The expected changes are originating from the New Plumbing Apprenticeship curriculum that will be more geared towards Heat Pumps; this is due to come into effect in December 2022 but more than likely will be completed in 2023. In the context of DKITs training, the participants (mainly plumbers) get a Broader understanding of other skills and crafts (electrical, F-gas) and building infrastructure (insulation, airtightness). They also get an understanding that Heat pumps are a more precise piece of equipment than the traditional boiler, which tended to be oversized by choice. With the main perceived issue regarding the specialized training/s around HPs being represented by the minimum entry standards need to be maintained, only people that have experience with heating systems can apply for the course, as a minimum requirement of knowledge is required but with a diverse set of certification schemes available (METAC, DKIT, WWETB, Ballyfermot ETB).

In the case of political/legal barriers, there are no such obstacles (but perceived barriers by installers are minimum requirement within grant scheme and Grant scheme bureaucracy). While public support is present, as GreenTech Skillnet and ETBs are providing funding for training (up to 30%) but these could do with more consistency as there are different funding mechanisms available in different regions. However, an essential challenge remains the differences between the three available courses, meaning they are not all equal in scope or content but are serving same clientele and the same requirement for grant funding.

The respondent seeing the current and future evolution of national policies related to the training and upskilling of Heat Pump-specialised workforce, moving towards a better national coordination, from apprenticeship to post-apprenticeship.



As per recommendations for future policy changes regarding Heat Pump-specialised workforce training, the interviewee highlighted the need for a 5-year re-assessment (similar to the gas industry), changes in industry. Need to have a register, and to continue to be registered, you must re-assess every 5 years as per Climate Action Plan.

Austria/Upper Austria has a long-established market for HPs. There are overall acceptable quality of skills and competencies among planners and installers. There is a wide basic knowledge on HP planning and installation, especially in the residential sector. Designing and installing a HP for a residential new build is a project that just about all installers can competently and skilfully execute.

According to the skills and competencies definition presented previously in this document, the competencies required for the HP market in Upper Austria are the normal competencies of an installer. They are not particularly HP specific. Regarding skills, there are still gaps on the level of detailed planning: design and required flow temperature, especially in situations involving more complex systems. The availability of required skills on the market decreases with increasing flow temperature and building complexity.

A significant challenge is currently the extremely high demand from the market for skilled and competent workers. There is an overall shortage of staff, and thus a shortage of skilled and competent staff, within planning and installation companies.

There are overall acceptable quality of skills and competencies among planners and installers. In Austria, heating installer is a skilled trade. Training takes place as apprenticeship: a "dual system" of vocational schools and on-the-job training in heating installation companies. The training lasts 3-4 years. Apprentices spend part of their time in the school and part in practical training in the company in which they are employed. Additionally, there are schools for engineers ("HTLs") and specialised university programmes (such as the bachelor and master programmes for Eco-Energy Engineering at the University of Applied Sciences Upper Austria) that also cover HP technologies.

The education system in Austria leads to good technical skills. Customer oriented competencies are taught in the school part of the apprenticeship as well as through on-the-job training. The quality of a trainee's competencies is better in cases where the training company is also of higher quality. Business and organisational competencies seem to be higher in installation companies of 10+ employees. In Upper Austria, there are a very large number of 1-person companies. These are typically installers who have good technical skills and who became self-employed. They are recognised as good and reliable installers in their region and often also take care of repairs in a timely manner. These persons spend most of their time on job sites and have very little time to invest in improving their business and organisational competencies. Health and safety: It seems that overall acceptable health and safety competencies are available. A main issue in Upper Austria is the overall shortage of staff, also in skilled trades. This has been intensified through the large increase in the demand for HP installations in the past years. Trainings are usually offered through the public education system, based on legally implemented schooling schemes. Vocational schools are public and therefore funded by the government. There are also further certification schemes (such as those offered by the AIT - Austrian Institute of Technology). There are quite well known, have been available for several years already, and are offered throughout Austria.



Funding programmes on regional and national levels as well as other aspects of the regulatory framework set stringent quality standards for HPs. This incentivises installation companies to invest in the training and upskilling of their staff.

Additional market pull for upskilling would be possible. For example, if voluntary certification schemes, such as the "certified HP planner and installer" programme offered by the AIT, were more strongly recognised on the market, and requested by end-users, companies would have a stronger incentive in sending their employees to be certified (since this would offer them a competitive advantage on the market). This would increase the overall specialised knowledge and skills on the market and could lead to higher quality and performance of HP installations.

Furthermore, In Upper Austria, legislation for buildings and heating and cooling systems are strategically used to drive innovation by regularly updating the regulatory framework towards higher efficiency and lower emissions. In funding programmes, strict efficiency criteria ensure that only high-quality technologies are installed and that the further development of the HP sector contribute to energy efficiency and renewable goals. Increasing complexity due to stricter criteria leads to continuous need for technical up-skilling.

The government's decarbonisation target (which includes eliminating fossil-fuel heating) is a key driver for the HP market. The activities and policy framework put in place to achieve these goals support the development and implementation of high efficiency and renewable solutions – including heat pumps. They also intensify the need for overall training and up-skilling of heating installers.

Up-skilling of planners and installers in the HP sector is important to keep up with technical innovations and overall increase in demand for HP, as well as to ensure the quality of new installations.

Challenges:

In addition to the overall lack of staff in many fields, young people tend to prefer to pursue paths of higher education over apprenticeships. This is negatively affecting the number and level of basic competencies of persons entering apprenticeship programmes.

Generally, the skills and competencies of person willing to start an apprenticeship are lower than in the previous decades. Helping them to acquire better basic skills (e.g., writing and maths) is crucial for them to access the training programme and become a skilled and competent heating installer.

4.8. Data gathering: Templates

A set of templates will be designed by EHPA for data gathering as per the requirements needed with a list below (these are attached as annexes in part 6 of the document):

Name of template	Purpose
Partner updated survey	To gather data and inputs as part of the EHPA designed survey (MS Forms template)
Partner Interviews (same as 6.3. Partner updated survey results: Survey questions)	To gather data and inputs as part of the partner organised interviews (MS Word template)
Websites (same as 6.3. Partner updated survey results: Survey questions)	To gather data and inputs on the project and partner websites (MS Forms template)
Events	To gather data and inputs as part of events where EHPA participates in / EHPA annual Forum (printed MS Word template with QR code to survey tool)



5 Competency Framework Structure

Based on the extensive previous research that uses multiple tools and interactions with experts from the field as well as training providers, while also examining the work being done in other projects and gathers models from other fields, the Competency Framework can be found below. It uses colours to identify the job families of the value chain, as well as competency clusters that group the core competencies, being followed by definitions and key indicators.

5.1. Pilot Region Heat Pump Workforce Competencies

5.1.1 Austria

In Austria, the specification, design, and installation of HP systems are typically carried out by the same professionals.

Heating installer is a skilled trade called "Installation and building technicians" (Installations- und GebäudetechnikerIn). Training last around 3-4 years and takes place as apprenticeship: a "dual system" of vocational schools and on-the-job training in heating installation companies. Training is very hands-on oriented.

Installation and building technicians plan, assemble, set up, maintain, and repair heating and domestic hot water systems and their components.

Tasks and competencies include:

- measuring rooms and creating plans
- selecting, procuring, and checking required materials
- reading and applying technical documents,
- determining the work steps, means and methods.
- setting up the workspace
- cutting pipes made of different materials (e.g., copper, plastic), making connections (e.g., by plugging, screwing, or possibly welding) and laying them.
- carrying-out function, pressure and tightness tests of pipes and insulating them against heat loss and condensation
- connection, commissioning and servicing of devices and heating systems
- troubleshooting and carrying out maintenance and repair work of piping and control systems
- advising customers on the technical, ecological and design possibilities of the installations.
- collecting technical data about the work process, the work results and the test results
- execution of work in consideration of the relevant safety and environmental standard

Other professionals and competencies required along the heat pump value chain:

Electrical connections need to be installed and commissioned by a qualified electrician. "Electrician" is also a skilled trade, learnt through a similar a "dual system" of vocational schools and on-the-job training (apprenticeship).



According to Austrian and EU legislation and standardisation, certification is required for handling refrigerants. A trained heating installer, for example, needs an additional exam on specific aspects of handling refrigerants to get the official certification.

Qualification and certification measures in connection with stationary refrigeration and air conditioning systems as well as heat pumps are required for the following activities:

- tightness control of installations with 3 kg of fluorinated greenhouse gases or more and of installations with 6 kg of fluorinated greenhouse gases or more in hermetically sealed systems;
- recovery;
- installation;
- maintenance and repair

Opportunities for acquiring further competencies:

As an extension of the dual vocational training heat pump installers can continue their training to become a "master craftsperson" (professional advancement and enables them in becoming a business manager/owner).

Additionally, there are schools for engineers ("HTLs") and specialised university programmes (such as the bachelor and master programmes for Eco-Energy Engineering at the University of Applied Sciences Upper Austria) that also cover heat pumps technologies.

There is also a range of voluntary further education opportunities and certified training programmes that go deeper into specific topics, e.g., the multi-day training course to become a certified heat pump planner and installer (offered in Upper Austria by ESV together with AIT and Wärmepumpe Austria)



5.1.2 Ireland

Heat pump designers and installers are usually from the plumbing trade and have additional courses or training undertaken to specialise in heat pump systems. Apprenticeship.ie has a database of occupational profiles for trades and crafts in Ireland. The Plumbing (National framework Qualification (NFQ) level 6) can be found here: <https://apprenticeship.ie/career-seekers/get-started/learn-more/construction-card/plumbing-l6> and the core skills of a plumbing craftsperson listed by Apprenticeship.ie is shown below:

- Use of plumbing tools and materials
- Pipe fitting
- Pipe bending
- Inspection and testing of pipework.
- Fault diagnosis
- Design/installation of central heating systems including:
 - solid fuel
 - o gas
 - o oil fired boilers
 - o flues and ventilation
 - o fuel storage and distribution
- Design/installation of plumbing systems including:
 - o mains water supply
 - o water treatment
 - o domestic and multi-storey hot and cold-water supply
 - o storage tanks, cylinders, calorifiers
 - o sanitary appliances and discharge pipework and systems
- Installation of:
 - o gas appliances
 - o firefighting systems.

Heat Pump Designer are usually a plumber (trade) with training or experience, or an engineer that works on heating systems. The design is usually undertaken by the Heat pump supplier or manufacturer to ensure their products are installed correctly. The main competencies that are addressed by heat pump training in Ireland either by third level institutes (Dundalk Institute of Technology, and Atlantic Technological University) or by professional companies such as Tipperary Energy Agency (TEA), or Midland Energy Training and Assessment Centre (METAC), of which the main points on all syllabuses that are directed at heat pump designers contain aspect such as:

1. Heat Pump Fundamentals – Refrigeration Cycle, components, building standards, performance of heat pumps.
2. Design aspects – Location selection for indoor and outdoor units, heat loss assessment of a building, site constraints.
3. Design criteria – for hot water and heating systems, heat requirement and output
4. Understanding and producing electrical and mechanical schematics
5. Commissioning – System flushing, cleaning, filling, and venting, balancing flows on radiators/underfloor, heating compensation curve settings adjustment.
6. Handover – Benefits of heat pumps, feasibility of heat pumps, control strategies and showcasing.



Heat pump designers and installers are usually from the plumbing trade and have additional courses or training undertaken to specialise in heat pump systems. The Core skills of Plumbers L6 is shown below:

- Use of plumbing tools and materials
- Pipe fitting
- Pipe bending
- Inspection and testing of pipework.
- Fault diagnosis
- Design/installation of central heating systems.
- Design/installation of grey water systems.
- domestic and multi-storey hot and cold-water supply
- storage tanks, cylinders, calorifiers
- sanitary appliances and discharge pipework and systems
- Installation of gas appliances and firefighting systems.

The electrical connections made by an electrician who is registered under RECI, and F-Gas handled by Refrigeration who is a registered F-gas technician.

Although there is no direct heat pump installer course, as all courses have some aspect of design, commissioning and handover, the main points on all syllabuses that are directly related to installers are as follows:

1. Practical training on the system installation
2. Pipework type, insulation, jointing & cutting method.
3. Installation requirements – Manufacturer requirements and regulation requirements
4. Selection and installation of room thermostats
5. Safety regulations

For Ground Source heat pumps installers and designers in addition to above, competencies are the same as a plumber and engineers, but there is extra training on handling of glycol, fusion welding, and purging air from brine ground loops.

In Ireland there needs to be a further division of the job specification for plumber at the moment since for each heating system it is required

- a) a heating system designer,
- b) a pipework, underfloor or radiator installer,
- c) a tech savvy heat pump and controls installer and,
- d) a maintenance and service technician.

There is grant funding available in Ireland for retrofitting houses and installing heat pumps. As part of the checks undertaken by Sustainable Energy Authority Ireland (the grant funder), there is a minimum competency requirement for heat pump installers and are outlined below.

It is important to note that the courses Heat pump systems and Domestic Heat pump installation are no longer being run, but an evolved and a more advanced version of each is currently being offered. It is also mentioned that equivalent courses may be considered by SEAI.

Contracted Retrofit Measure	Minimum Requirement for Grant funding
Heat Pump Systems	<ul style="list-style-type: none"> - Fetac/QQI Level 6 Advanced Craft in Plumbing, including a module on minor electrical works, or equivalent. - Certificate of competence from the specific manufacturer of the heat pumps installed, based on an adequate training programme - Fetac/QQI Level 6 Heat Pump Systems (Course Code C30263) and supplemental Domestic Heat Pump Installation (Code 700606) or equivalent - A Registered Electrical Contractor (REC) is required to supervise and sign off the electrical installation of a heat pump system - An F-Gas engineer is required to carry out and certify heat pump system installations involving refrigerant pipework and charging as per the F-Gas Regulation
Heating Controls	<ul style="list-style-type: none"> - a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. - NSAI's S.R. 54:2014 – Code of practice for the energy efficient retrofit of dwellings, - The DHPLG and SEAI Document Heating and Domestic Hot Water Systems for Dwellings – Achieving Compliance with Part L,

For to HP and RES integration scenarios, for retrofit installations, everything is usually managed by the *Retrofit One Stop Shops* from applying for grant funding to contractor selection, installation, and commissioning. For new builds, it is simply a main contractor that will hire in a plumbing company to install the HP and pipework (with no guarantee of a high-quality installation) and will hire in a company that focuses on RES installations. The RES company will then be able to integrate control of both the HP and the RES.



5.1.3 Spain

Similarly, a HP system design in Spain, depending on its complexity, is normally addressed either by technical engineers (180-240 ECTS credits) or by graduated thermal system project technicians (ECVET levels 3-4). Although they can be bound to the manufacturer, very often this service is outsourced to or managed by the distributor /supplier at the last mile selling point or even provided directly to the end user /customer which must approach these specialised designer profiles, which act as brand prescribers too.

Installation work is performed by thermal systems installers (ECVET levels 2-3), usually plumbers / electricians with complementary skills acquired (electrical / plumbing / F-gas) whatever the way might be (manufacturers, VET lifelong learning etc.) as long as they be officially certified and included in the official installers' public registry. Associated training for installers (official; ECVET level 2): 480 h., including assembly of heating installations (240 hours); Maintenance of heating installations (240 hours) and includes carrying out the assembly, maintenance and repair operations of heat production facilities and their transmission by fluids, in accordance with the processes and assembly and maintenance plans, with the required quality, complying with current regulations and regulations, in conditions of personal and environmental safety.

Very recently, a specific profile for ground source-based solutions installers and designers has been drawn up and approved. Complementary skills can be achieved either through additional training or within the official traineeship itinerary, in the first case they must be validated through an exam unless they have been officially approved. These skills include assembling and commissioning in-circuit geothermal exchange facilities with closed collection (zero circuit comprising exchangers, vertical, or horizontal, inclined, and driving to the engine room) and engine room, carrying out the maintenance, compliance, environmental protection, planning of preventive activity, quality standards, safety of geothermal exchange facilities and handling of heat transfer fluids.

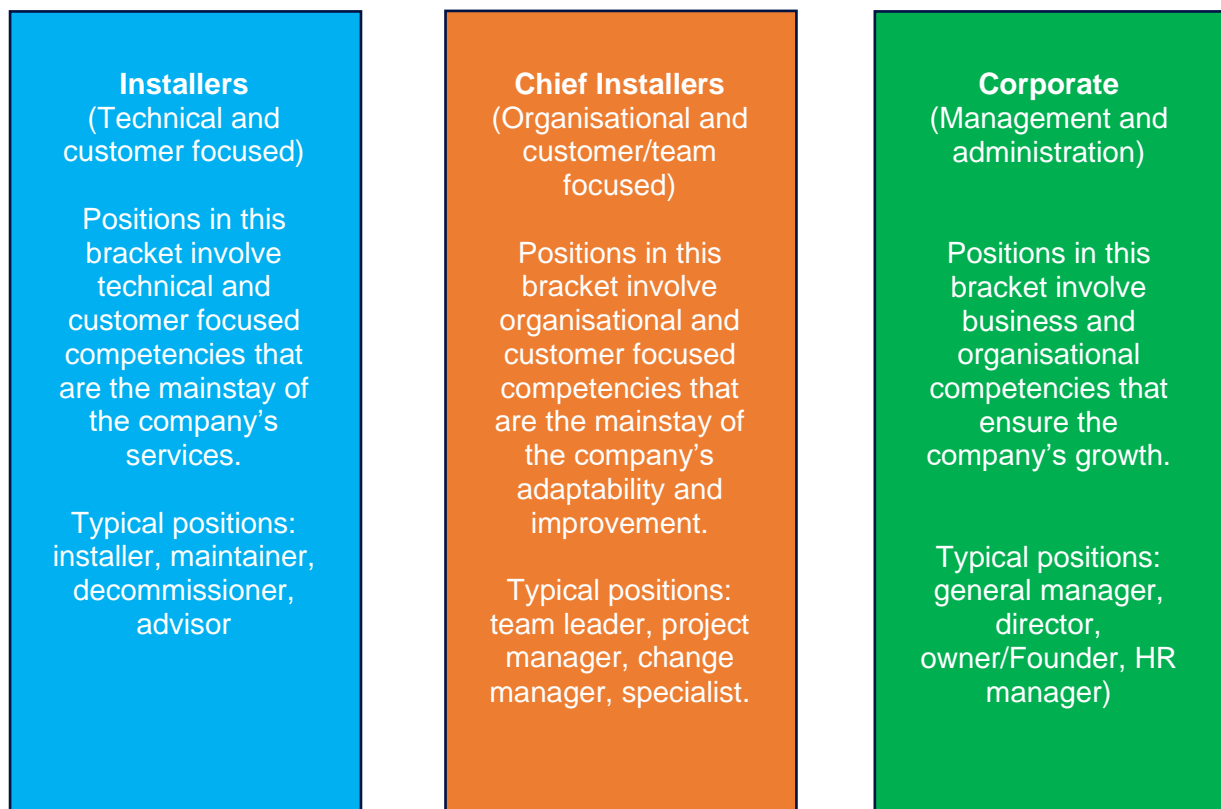
Electrical connections need to be installed and commissioned by a registered Electrician / electric power installer and a registered F-gas engineer / installer professional / company is required to connect the outdoor unit and the indoor unit, charge, refill, maintain and certify the refrigerant system.

There is an official registry of authorised installing / designing entities, either natural persons (individual entrepreneurs) or legal persons. To be registered there must be at least one officially registered installer / designer in the firm, but as such there is not an integrated, publicly accessible registry of officially authorised individuals . You can browse the registry through different criteria, particularly the type of installations they are entitled to carry out.

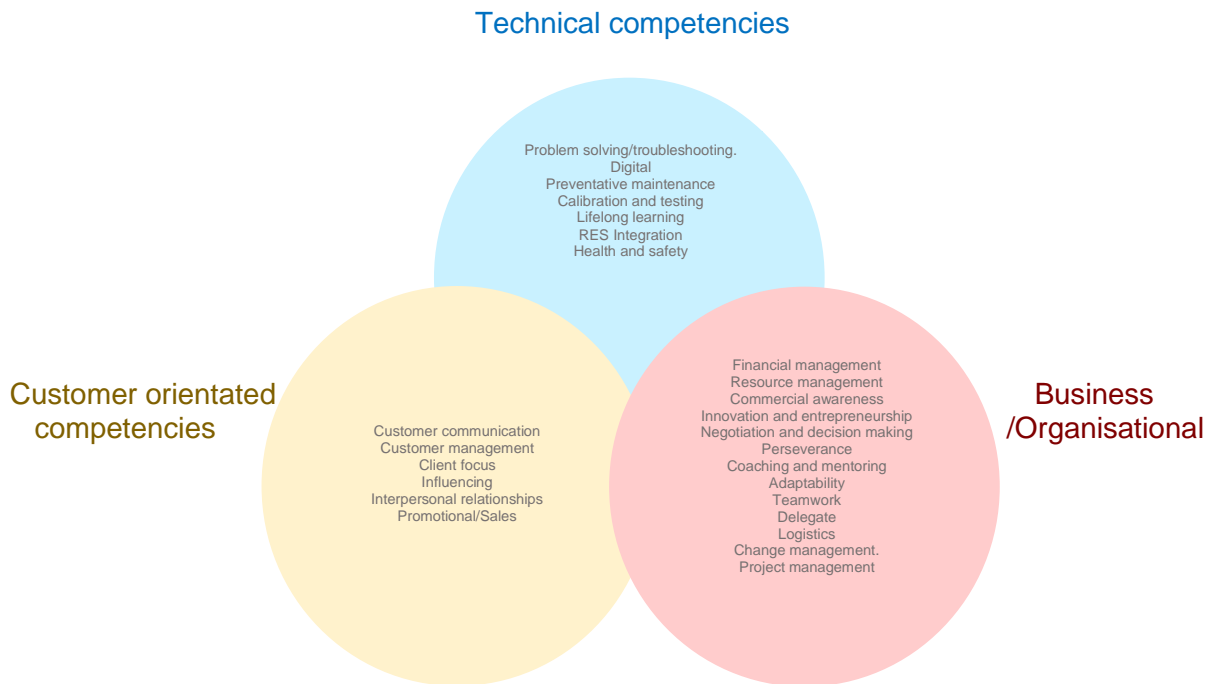
5.2. Value chain positioning

Segmenting job positions into families along the value chain of an organisation or sector determine (depending on the size of the organisation) whether it has the capabilities necessary to achieve maximum impact/efficiency and the capabilities necessary. This segmentation can be used to set the requirements for each position in the organisation, to view potential skills needed for each level, to provide learning/training opportunities, and to design structured career development programmes based on organisational and market needs.

As such three main segmentations have been made, be aware that these intertwine in individuals and/or teams and that (given the size of the organisation, previous learnings, location, technical legal requirements, market fluctuations etc) a professional working in the heat pumps sector would need most of them to participate in a competitive market. Note that the work mainly covers HP installers and does not look into common areas of work that are complementary or additional, such as plumbers or electricians.



5.3. Core competencies clusters



The following pages set out all 26 of the competencies and the behaviours expected at different levels which reflect the variance in complexity, scope, and responsibility across professional responsibilities. Given small companies, the need for lifelong learning and improvement at all levels, effective decision making based on understanding of all levels, and competition, it is assumed that professionals possess not only the competencies of their cluster, but also a combination of competencies from the other clusters.

Technical competencies

Problem solving/troubleshooting is the process of identifying a problem, developing a plan to address the problem, and implementing that plan to solve it. It involves using critical thinking skills, creativity, and decision-making to find a solution to a challenge or issue. It may involve breaking down a problem into smaller, more manageable pieces and then finding a way to solve each piece individually. This process can involve trial and error, the ability to think flexibly and adapt to new situations, as well as learning from failures and asking for support while describing the issue in a detailed manner.

Digital competencies refer to the knowledge, skills, and abilities that individuals need to effectively use digital technologies, the internet, relevant applications, and devices. Some examples of digital competencies include basic computer literacy, hardware selection (e.g., assisting others to troubleshoot basic software and hardware issues), digital communication skills. While more complex ones can include BIM general knowledge or BIM for energy efficiency. This requires great adaptability as hardware, but especially software evolves and changes quite rapidly.



Preventative maintenance is the regular inspection and maintenance of equipment and facilities to prevent problems from occurring or to detect and correct problems in their early stages. This type of maintenance is designed to extend the life of the equipment, improve its performance, and reduce the need for costly repairs or replacements. It is typically planned and may be performed on a regular basis (e.g., annually) depending on the needs of the equipment and the facility. This can include hardware and software maintenance (e.g., security updates for software).

Calibration and testing are often closely related, as the results of testing can be used to identify the need for calibration, and the process of calibration can involve testing to ensure that the device or system meets the required standards. Calibration is the process of adjusting a device or system to ensure that it meets a specific set of standards or requirements. This typically involves comparing the device or system to a known standard and making any necessary adjustments to bring it into compliance with the standard. Testing is the process of evaluating a device or system to determine its performance and capabilities. Testing can be used to verify that a device or system is functioning properly, to identify any problems or deficiencies, or to evaluate its suitability for a particular application.

Lifelong learning is the ongoing pursuit of knowledge and skills throughout one's lifetime. It is a way of continuously improving and expanding one's abilities and knowledge, both for personal development and for career advancement. It can consist of formal education, training programs, workshops, and self-study. It can involve learning new skills, gaining knowledge in a particular field or discipline, or simply staying up to date with developments in a particular area of interest. Lifelong learning can be classified as a competence as it is a particular character trait of interested parties and will lead to the highest possible technical competency in the sector as advancements in technology and regulation continue.

RES Integration is the process of integrating renewable energy sources into the existing energy infrastructure and grid. It involves several challenges, including technical, economic, and regulatory issues. Technical challenges can include the intermittent nature of some renewable energy sources, the need to match the output of the renewable energy system to the demand for energy, and the need to ensure the stability and reliability of the grid. Heat pumps have a unique ability for a heating system and that is they can affect grid stability, to help alleviate the pressures on the grid techniques like RES integration and demand-response with heat pumps can be undertaken. Economic challenges can include the upfront costs of installing renewable energy systems and the need to ensure that the costs of integrating these systems are balanced with the benefits. Regulatory challenges can include the need to adhere to various laws and regulations governing the use of renewable energy and the integration of these systems into the grid.

Health and safety refer to the measures that are taken to protect the health, well-being, and safety of individuals in the installation, operation, maintenance and decommissioning of HPs. These can include a wide range of activities, such as the implementation of safety protocols and procedures, the use of personal protective equipment (PPE), the provision of first aid, the implementation of policies and regulations referring to flammable substances, electrical equipment and its operation/connection to the grid, operation of tools and heavy-duty equipment, etc.



Customer orientated competencies

Customer communication refers to the exchange of information, ideas, and messages between a business and its customers. This can take many forms, including face-to-face interactions, phone conversations, email or written correspondence, and social media interactions. As such, it helps businesses to understand the needs and preferences of their customers, and to address any issues or concerns that they may have. It also helps to build trust and establish a relationship of mutual respect between the business and its customers. By effectively communicating with customers, businesses can improve customer satisfaction, build loyalty, and increase the likelihood of repeat/expanded business.

Customer management refers to the various activities and processes that a business uses to manage its relationships with customers. By effectively managing their customer relationships, businesses can improve customer satisfaction, build loyalty, and increase the likelihood of repeat/extended business. Some common strategies for customer management include providing excellent customer service, offering incentives for customer loyalty, and using customer feedback to improve products and services. Customer management can also involve the use of technology, such as customer relationship management (CRM) software, to track and manage customer interactions and data.

Client focus refers to the ability of a business to prioritize the needs and preferences of its customers. This can involve a variety of activities, such as listening to and understanding the needs and concerns of clients, responding to their inquiries and requests in a timely and effective manner, and adapting products and services to meet their specific needs. By prioritizing the needs of their clients and demonstrating a commitment to meeting their needs, businesses can improve customer satisfaction, build loyalty, and increase the likelihood of repeat/expanded business.

Influencing refers to the ability to affect or change the thoughts, beliefs, behaviours, or decisions of others via skills such as: persuasion, negotiation, leadership, and motivation. To be effective at influencing others, it is important to be able to communicate clearly and effectively, to be able to build rapport and establish trust, and to be able to anticipate and address any concerns or objections that may arise before, during and after the installation process.

Interpersonal relationships are the relationships that stakeholders have with one another and can represent a challenge, as they often involve negotiating differences, resolving conflicts, and managing expectations. To build and maintain positive interpersonal relationships, it is important to be able to communicate effectively, to be empathetic and understanding, and to be able to respect and appreciate differences of knowledge/opinion. It is also important to be able to resolve conflicts in a constructive manner and to be able to compromise and negotiate when necessary.

Promotional/Sales refers to the process of persuading someone to purchase a product or service. It can involve a variety of activities, including identifying potential customers, presenting the benefits of a product or service, negotiating prices and terms, and closing the sale. Sales is an important function in many businesses and organizations, as it is typically the primary source of revenue. Effective sales strategies can help businesses attract and retain



customers, and to increase their profitability/growth. Some common sales strategies include building relationships with customers, offering incentives or discounts, loyalty schemes and extended services/guarantees.

Business/Organisational competencies

Financial management refers to the process of managing the financial resources of the organisation. This includes activities such as budgeting, forecasting, financial planning, and financial analysis. By managing their finances effectively, businesses can improve their financial performance, increase their profitability, and reduce the risk of financial problems or setbacks. Some common financial management tasks include preparing and monitoring budgets, forecasting future financial performance, analysing financial/market data, and making informed decisions on how to allocate financial resources.

Resource management refers to the process of planning, organizing, and controlling the use of resources, such as staff, tools, time, and materials, to achieve specific goals and objectives. Resources can be physical, such as equipment and facilities, or intangible, such as knowledge and skills. By managing resources effectively, organisations can improve their productivity, reduce costs, and increase their competitiveness. Some common resource management tasks include identifying and prioritising the use of resources, adequately allocating resources to different projects and activities, and monitoring and controlling the use of resources to ensure that they are used efficiently.

Commercial awareness refers to the ability to understand and analyse the commercial, financial, and economic factors that impact an organisation. It involves an understanding of the business environment in which the organisation operates, as well as an understanding of the strategies and practices that are used to create and sustain a competitive advantage and take informed decisions. To develop commercial awareness, it is important to analyse and interpret data and information about the market, client preferences/trends and industry, while being able to think strategically about the business environment. It is linked to the ability of communicating effectively about commercial and business issues, adapting to changing circumstances and environments. This also refers to the managerial competencies: the decision-making abilities which drive the selection/adoption of long-term strategies and initiatives. Managerial competencies include leadership, strategic planning, organizational management (e.g., the ability to understand business benefits and business risks of model-based workflows).

Innovation and entrepreneurship are closely related concepts that refer to the process of creating and developing new ideas, products, or services, and turning them into successful ventures. Innovation involves the development of new or improved products, services, processes, or technologies that meet the needs of customers or solve problems in a new, more efficient, or different way. It can involve the introduction of new ideas, the application of existing knowledge in new contexts, or the combination of different ideas or products in novel ways. Entrepreneurship refers to the process of starting and running a business and involves taking on the risk and responsibility of developing and bringing a new product or service to market. Entrepreneurs are individuals who identify a business opportunity and take the necessary steps to turn that opportunity into a successful venture. This can involve identifying a need or



gap in the market, developing a product or service to meet that need, and creating and implementing a plan to bring the product or service to market.

Negotiation and decision making allow individuals and teams to resolve conflicts, reach agreements, and make choices that align with their goals and values. To be effective at negotiation and decision making, it is important to be able to communicate clearly and effectively, to be able to listen to and understand the perspectives of others from the team and clients, and to be able to analyse and objectively evaluate information. It is also important to be able to think critically and creatively, and to be able to identify and weigh the potential risks and benefits of different options.

Separately, negotiation is the process of reaching an agreement or compromise between two or more parties who have different needs or interests. It involves the exchange of ideas and data, the exploration of different options and alternatives, and the development of a mutually acceptable agreement. While decision making is the process of evaluating options and making choices between them, considering the pros and cons of different options, and selecting the one that best meets the needs and goals of the decision maker.

Perseverance is the ability to continue working towards a goal or objective despite setbacks or difficulties. It is the ability to maintain motivation and focus, even when faced with challenges or obstacles. It involves persistence, determination, and the ability to keep going even when things become difficult for the company or individual/s. It also involves having a positive attitude and being able to maintain a sense of perspective, even when things do not go as planned.

Coaching and mentoring are forms of development and support that involve working with individuals to help them achieve their goals and improve their performance.

Coaching is a process in which an experienced professional, called a coach, works with an individual to help them improve their skills, knowledge, or performance in a particular area. Coaching often involves setting goals, providing feedback and guidance, and helping the individual to develop and implement a plan for achieving their goals. It can focus on a specific skill or area of performance, such as leadership, communication, or sales.

Mentoring is a more long-term process in which an experienced individual, called a mentor, provides guidance, support, and advice to a less experienced individual, called a mentee. The mentor serves as a role model, advisor, and sounding board, and helps the mentee to develop their skills and knowledge, and to navigate their career. This includes administration competencies: the day-to-day organizational activities as required to meet and maintain strategic objectives. Administration competencies include contract administration, HR and recruiting, etc. (e.g., identifying BIM knowledge and skills for large collaborative projects).

Adaptability refers to the ability to adjust to new situations or demands. It involves being flexible, open-minded, and able to adapt one's behaviour or approach in response to changing circumstances. It involves the ability to learn and adapt quickly, to be resilient in the face of change, and to be open to new ideas, processes, and approaches. By developing adaptability, individuals and organizations can be better prepared to respond to and thrive in changing environments/market conditions.

Teamwork is the process of working collaboratively in a group as to achieve a common goal/shared objective. As such, it allows individuals to leverage their different skills and expertise to achieve more than they could individually. It also promotes a sense of shared responsibility and accountability and can lead to increased productivity and efficiency. To be



effective at teamwork, it is important to be able to communicate effectively with team members, to be able to listen and understand the perspectives of others. It is also important to be able to resolve conflicts and to be open to the ideas and contributions of others.

Delegate (delegating) represents to assign a task or responsibility to someone else with the expectation that they will complete it in a competent and reliable manner. To be effective at delegating, it is important to identify the tasks and responsibilities that can be delegated, to choose the right person for the task, to provide clear instructions and expectations, and to provide support and guidance as needed. It is also important to be able to follow up and monitor the progress of the delegated tasks to ensure that they are completed effectively and efficiently. Delegating can help individuals and organisations to be more productive and efficient, while better utilising the skills and expertise of their team members.

Logistics refers to the process of planning, organising, and managing the movement and storage of goods, services, and information from their point of origin to their destination. It involves coordinating the various activities and resources that are required to transport and distribute products and materials, including transportation, warehousing, and distribution. Logistics is an important function of businesses, as it is responsible for ensuring that products and materials are delivered to customers in a timely and efficient manner. Effective logistics management can help organisations reduce costs, improve customer satisfaction, and increase their competitiveness.

Change management is the process of planning and implementing changes in a business or organisation in a controlled and organized manner. It is particularly important in today's fast-paced and constantly changing business environment, as it allows organisations to respond to changing market conditions, customer needs, and technological developments. Some common change management activities include identifying the need for change, assessing the impact of the change, developing a plan for implementing the change, communicating the change to stakeholders, and monitoring and reviewing the progress of the change. Noted also as research and development competencies: abilities needed to evaluate existing processes, investigate new solutions and facilitate their adoption. change facilitation, knowledge engineering, teaching, and coaching. (e.g., the ability to monitor, select and recommend technological solutions that may enhance the deliverables of an organization).

Project management is the process of planning, organising, and controlling the resources and activities required to complete a specific project within a predetermined time frame and budget. It involves defining the scope of the project, setting clear goals and objectives, identifying the resources and tasks required to complete the project, monitoring, and controlling the progress of the project to ensure that it is completed on time and within budget, and communicating with stakeholders.



5.4. Key indicator levels

Key Indicators (1st level)

The behavioural indicators associated with the first level of the selected competencies, used to showcase the requirements for needed for the successful employment of the knowledge and skills. This level can be associated with installers, maintainers, decommissioners, junior advisors, project officers.

Problem solving/troubleshooting: identifies a problem/issue related to the installation; develops a plan to solve it; utilizes the support of others; breaks the issue into smaller pieces; learns from the experience.

Digital: basic to advanced knowledge of digital technologies employed in the installation process (hardware and software), basic to medium digital communication tools and troubleshooting, ability to learn new processes and digital tools.

Preventative maintenance: performs the necessary hardware and software maintenance required, tracks the maintenance and any related issues using digital tools, liaises with the end user and makes recommendations (if needed).

Calibration and testing: high ability to calibrate and test the installation based on experience and data gathered before and during the process, knowledge of operating parameters and standards associated with them, ability to make needed adjustments, ability to determine the performance of the system.

Lifelong learning: interest and ability to participate in continues training as well as adaptability in using newly learned skills and knowledge in day-to-day work. Trainings mainly focusing on technical aspects.

RES Integration: technical understanding of the integration of HP installations into RES generation and storage, as well as knowledge of the economic aspects of such an integration. Ability to liaise, evaluate and make requests for such integration or additional installation to other sector experts.

Health and safety: fully up to date with the necessary health and safety provisions, protocols, standards and provisions for the installation process and ancillary activities. Such provisions might differ from country to country. Fully up to date and certified in any other supporting activities from a health and safety point of view (e.g., F-gas, electrical).

Customer communication: ability to liaise with end-users and to explain the installation process (in a non-technical way if necessary) in face-to-face or other types of interactions (e.g., via phone), as well as the timeline, resources, steps, and anything else related to the process. Interpersonal skills and a customer orientated approach that complements the technical and business side.

Customer management: knowledge and willingness to improve one's customer service skills and knowledge by gathering technical, business and project management abilities and utilising



them. Ability to receive, record and transmit customer feedback towards services and products, ability to utilise a CRM (if available).

Client focus: propensity to use one's technical skills to prioritise the needs and preferences of the customer via the gathering of data, giving clear information to the client (in a timely and accurate manner) and planning the project beforehand as to achieve the desired results.

Influencing: clear and effective communication skills towards the end-users based on technical and planning knowledge that is provided in a timely manner and in a way that helps building rapport and trust between the two sides.

Interpersonal relationships: establishing a mutual beneficial rapport with the client based on clear and effective communication that is managing expectations and is based on experience. Ability to build and maintain positive relationships before, during and after the installation process, as well as to explain the process, decision-making and any potential issues to the customer in an effective way.

Promotional/Sales: ability to identify potential customers by presenting the benefits of a product or service, negotiating prices (if suitable, with support from other team members) and terms (if suitable, with support from other team members), and closing the sale. Capacity to explain the products clearly and effectively, services and the timeline associated with providing them, while recognising the importance that sales, customer satisfaction/return customers have in the sustainable functioning of the organisation. Knowledge of the process of building relationships with customers, and the incentives or discounts, loyalty schemes and extended services/guarantees that the organisation is currently/planning to offer.

Financial management: pricing knowledge of the products and services offered by the organisation, as well as ability to offer alternatives between them (and the factors that influence each choice) to the end-user for an informed decision. Inclusion of aspects relating to financial management in the planning and execution of the installation process.

Resource management: ability to plan, organise and assess the resources needed for a specific installation project while considering any other project/s that are occurring at the same time (prioritising the use of resources, adequately allocating resources to different projects and activities). This includes: materials, equipment, time, support from other team members/departments in the organisation. Communicating effectively and in a timely manner the resources needed to other specialised departments or staff (e.g., logistical).

Commercial awareness: understanding of the business environment in which the organisation operates, as well as how individual projects represent a part of the business model and the organisational competitive advantage/s. Gather data, inputs and trends from customers and communicate it effectively to team leaders or other specialised staff.

Innovation and entrepreneurship: assist in the creation and design of new ideas, products, or services. Exhibit an innovative attitude towards solving problems based on prior experience and knowledge, as well as an entrepreneurial spirit of always improving one's work and services, given their importance in the functioning of the organisation. Make suggestions of how to improve areas of work.



Negotiation and decision making: communicate clearly and effectively, be able to listen to and understand the perspectives of others from the team and clients, and to be able to analyse and objectively evaluate information to take informed decisions. Able to think critically and creatively, to identify and weigh the potential risks and benefits of different options. Exchange ideas and data, explore different options and alternatives, develop mutually acceptable agreements between the company and clients.

Perseverance: ability to continue working towards a goal or objective despite setbacks or difficulties, while maintaining motivation and focus. It involves persistence, determination, and the ability to keep going, while having a positive attitude and being able to maintain a sense of perspective, even when things do not go as planned.

Coaching and mentoring: ability to engage in developmental activities and to receive support for achieving one's goals, while improving performance. Inclination to identify one's areas of improvement and to take the necessary steps to upgrade skills, knowledge, or performance in that area/s. Ability to set and achieve goals, provide feedback and guidance.

Adaptability: ability to adjust to new situations or demands. It involves being flexible, open-minded, and able to adapt one's behaviour or approach in response to changing circumstances. The ability to learn and adapt quickly, to be resilient in the face of change, and to be open to new ideas, processes, and approaches.

Teamwork: capacity of working collaboratively in a group as to achieve a common goal objective via shared responsibility and accountability. Ability to leverage the different skills and expertise of colleagues, and to communicate effectively, being able to listen and understand the perspectives of others. Openness to the ideas and contributions of others.

Delegate: effectively identify the tasks and responsibilities that can be delegated, choosing the right person for the task. Provide clear instructions and expectations with support and guidance as needed. Follow up and monitor the progress of the delegated tasks to ensure that they are completed effectively and efficiently.

Logistics: planning, organising, and managing the movement and storage of equipment. Be aware of the various activities and resources that are required to transport and distribute products and materials.

Change management: ability to implement planned changes in the installation process, and to provide feedback. Identify and partially assess the need and impact of the change/s, communicate the change/s to stakeholders, monitor and review the progress of the change/s.

Project management: planning, organising, controlling the resources and activities required to complete a specific installation project within a predetermined time frame and budget. It involves defining the scope of the project, setting clear goals and objectives, identifying the resources and tasks required to complete the project, monitoring, and controlling the progress to ensure that it is completed on time and within budget, and communicating with the customer.

Key Indicators (2nd level)



The behavioural indicators associated with the first level of the selected competencies, used to showcase the requirements for needed for the successful employment of the knowledge and skills. This level can be associated with team leaders, project managers, change managers, specialists.

Problem solving/troubleshooting: identifies a problem/issue related to the project; develops a plan to solve it that can be used in other similar situations; utilizes prior experience and knowledge; breaks the issue into smaller pieces from previous experience; learns and implements resources to prevent the issue from re-occurring.

Digital: medium to advanced knowledge of digital technologies employed in the installation process (hardware and software) and how it is associated with other processes, medium to high digital communication tools and troubleshooting, ability to assess and learn new processes and digital tools while making an informed decision on their usefulness.

Preventative maintenance: plans and potentially performs the necessary hardware and software maintenance required, tracks the maintenance and any related issues using digital tools while finding any relevant trends, liaises with the end user and makes recommendations (if needed), makes recommendations for ancillary services or additional hardware.

Calibration and testing: high ability to calibrate and test the installation based on experience and data gathered before and during the process, extensive knowledge of operating parameters and standards associated with them, ability to make needed adjustments and plan for such eventualities, ability to determine the performance of the system while comparing it with other installations and logging the results (making recommendations to the end user if needed as well as explaining the working system to them).

Lifelong learning: active participation in continues training as well as adaptability in using newly learned skills and knowledge in day-to-day work that is coupled with identifying missing knowledge and flagging it for future development. Trainings focusing on technical aspects, management, customer management, planning and resource allocation, developments, and trends in the field.

RES Integration: high technical understanding of the integration of HP installations into RES generation and storage, as well as medium knowledge of the economic and regulatory/standards aspects of such an integration. Ability to liaise, accurately evaluate requirements and make requests for such integration or additional installation to other sector experts or other teams in the same company. Ability to do such integrations, plan and suggest steps based on economic and availability aspects to the end user.

Health and safety: fully up to date with the necessary health and safety provisions, protocols, standards and provisions for the installation, maintenance, and decommissioning processes of HPs and those of ancillary activities. Such provisions might differ from country to country. Fully up to date and certified in any other supporting activities from a health and safety point of view (e.g., F-gas, electrical), as well as regulations relating to team working conditions and those of supporting/external teams of the project (e.g., construction, excavation). Ability to combine experience with regulations and standards as to streamline a safe, efficient process. Ability to underline the need for further health and safety required certifications as to expand the scope of work.



Customer communication: ability to liaise with end-users and to explain the installation process (in a non-technical way if necessary) in face-to-face or other types of interactions (e.g., via phone), as well as the timeline, resources, steps, and anything else related to the process (knowledge on how to make accurate estimates and use the tools necessary to record user questions and the peculiarities of each project). Interpersonal and a customer orientated approach that complements the technical and business side. Ability to use new communication tools, undertake customer centric trainings and liaise with other teams inside the organisation (e.g., communication department). Recognize the added value these types of interactions and knowledge bring to the business.

Customer management: knowledge and willingness to improve one's customer service skills and knowledge by gathering technical, business and project management abilities and utilising them, while constantly improving such related skills in the team. Ability to receive/give, record and transmit customer feedback towards services and products, to utilise a CRM (if available) and improve its use, to spot trends and issues and transmit the data to other departments. Based on first-hand experience with costumers and the installation process (as well as related ancillary activities), actively suggest and implement improvements to the process and services as well as incentives/special promotions or new products/services.

Client focus: propensity to use one's technical skills to prioritise the needs and preferences of the customer via the gathering of data, giving clear information to the client (in a timely and accurate manner), linking it with the processes of the organisation, planning the project beforehand, and giving past similar projects (if available) as examples to achieve the desired results. This competency requires knowledge of the communication tools and systems used by the organisation as to be able to respond to customer inquiries as soon as possible, as well as knowledge of the customer support programmes (if any e.g., loyalty programmes) that the organisation is utilising or planning to create.

Influencing: clear and effective communication skills based on organisational best practices towards the end-users based on technical, economic, and planning knowledge. Provided in a timely, detailed manner and in a way that helps building rapport and trust between the two sides. Motivation into making the project viable, persuasion based on experience and a clear decision-making process and planning, negotiation skills that assure a fair outcome for company and end user, leadership of the team in encouraging the same approach.

Interpersonal relationships: establishing a mutual beneficial rapport with the client (and team) based on clear and effective communication that is managing expectations and is based on experience. Ability to build and maintain positive relationships before, during and after the project, as well as to explain the process, decision-making and any potential issues to the customer in an effective way. This should be combined with the goals and practices of the organisation, from a client focused and business viewpoint.

Promotional/Sales: ability to identify potential customers by presenting the benefits of a product, service, and the organisation, negotiating prices (if suitable, with support from other departments of the organisation) and terms (if suitable, with support from other departments of the organisation), and closing the sale (while reporting the results to any other related departments). Capacity to explain in detail the products clearly and effectively, services and the timeline associated with providing them, while considering the importance that sales,



customer satisfaction/return customers have in the sustainable functioning and growth of the organisation. Extended knowledge of the building relationships with customers process, the incentives or discounts, loyalty schemes and extended services/guarantees that the organisation is currently/planning to offer (as well as providing inputs/feedback to them).

Financial management: pricing knowledge of the products and services offered by the organisation, as well as ability to offer alternatives between them (and the factors that influence each choice) to the end-user for an informed decision. Inclusion of aspects relating to financial management in the planning and execution of each project and budgeting for the team (yearly or best practice of the organisation). Recognition of the importance of financial project planning and its link to other staff or departments in the organisation. Ability to resolve potential financial issues related to the project and to offer solutions to resolve them. This competency is related to the HR aspect of the team's management, and the financial planning needed to maintain (decrease/grow) a team.

Resource management: ability to plan, organise and assess the resources needed for a specific installation project while considering any other project/s that are occurring at the same time. This includes: materials, equipment, time, team resources, support from other departments in the organisation. Communicating effectively and in a timely manner the resources needed to other specialised departments or staff (e.g., logistical) and identifying any trends that can support a more effective process. Consider the knowledge and skills of team members and other departments as for the most effective use of specialised resources, as well as make suggestions into improving such intangible skills. Ability to prioritise the use of resources, adequately allocating them to different projects and activities as per having a more developed knowledge of all projects taking place in the organisation.

Commercial awareness: understanding of the business environment in which the organisation operates, as well as how individual projects represent a part of the business model and the organisational competitive advantage/s. Gather data, inputs and trends from customers and team members, and communicate it effectively to other departments. Understanding of the strategies and practices that are used to create and sustain a competitive advantage and taking them into account as to make informed decisions. Interpret data and information about the market, client preferences/trends and industry, while adapting to changing circumstances.

Innovation and entrepreneurship: assist in the creation and design of new ideas, products, or services. Exhibit an innovative attitude towards solving problems based on prior experience, knowledge, support from other departments, as well as an entrepreneurial spirit of always improving one's work and services, given their importance in the functioning of the organisation. Suggest new or improved products, services, processes, or technologies that meet the needs of customers or solve problems in a new, more efficient, or different way. Introduce new ideas, apply existing knowledge in new contexts, combine different ideas or products in novel ways.

Negotiation and decision making: communicate clearly and effectively, be able to listen to and understand the perspectives of others from the team and clients, analyse and objectively evaluate information to take informed decisions. Argue the decision taken and plan for any issues that might arise, gather data from other departments in the organisation. Able to think critically and creatively, to identify and weigh the potential risks and benefits of different



options. Exchange ideas and data, explore different options and alternatives (considering the pros and cons of different options, and selecting the one that best meets the needs and goals of the decision maker), develop mutually acceptable agreements between the company and clients, resolve conflicts.

Perseverance: ability to continue working towards a team goal or objective despite setbacks or difficulties, while maintaining motivation and focus (for individual and team members). It involves persistence, determination, and the ability to keep going, while having a positive attitude and being able to maintain a sense of perspective, even when things do not go as planned.

Coaching and mentoring: ability to engage in developmental activities and to receive support for achieving one's goals, while improving performance. Inclination to identify one's areas of improvement (as well as those of the team) and to take the necessary steps to upgrade skills, knowledge, or performance in that area/s. Ability to set and achieve goals, provide feedback and guidance. Be a mentor, that provides guidance, support, and advice to a less experienced individual, a role model, advisor, that helps the mentee to develop their skills and knowledge, and to navigate their career. This includes administration competencies: the day-to-day organizational activities as required to meet and maintain strategic objectives. administration competencies include contract administration, HR and recruiting, etc. (e.g., identifying BIM knowledge and skills for large collaborative projects).

Adaptability: ability to adjust to new situations or demands. It involves being flexible, open-minded, and able to adapt one's behaviour (as well as that of the team) or approach in response to changing circumstances. The ability to learn and adapt quickly, to be resilient in the face of change, and to be open to new ideas, processes, and approaches that can have a significant improvement to the team performance.

Teamwork: capacity of working collaboratively in a group as to achieve a common goal/objective via shared responsibility and accountability. Ability to leverage the different skills and expertise of colleagues, and to communicate effectively, being able to listen and understand the perspectives of others (from the team and other departments). Openness to the ideas and contributions of other team members and departments, as well as a perspective on how these suggestions fit into the operations of the team. Ability to resolve conflicts in an equitable and transparent way.

Delegate: ability to effectively identify the tasks and responsibilities that can be delegated, choosing the right person in the team for the task (some tasks may be suitable to be delegated to other departments). Provide clear instructions, timeline and expectations with support and guidance as needed. Follow up and monitor the progress of the delegated tasks to ensure that they are completed effectively, while providing feedback.

Logistics: planning, organising, and managing the movement and storage of equipment. Be aware of the various activities and resources that are required to transport and distribute products, materials, and services, as well as the time needed to do so. Coordinating of the various activities and resources that are required in the transport and distribution (e.g., warehousing). Make suggestions on the logistical chain as to reduce costs, improve customer satisfaction, and increase organisational competitiveness.



Change management: ability to implement planned changes in the installation/team process, and to provide feedback. Identifying the need for change, assessing the impact of the change, developing a plan for implementing the change, communicating the change to stakeholders, and monitoring and reviewing the progress of the change (this may require liaising with other departments of the organisation). Actively investigate new solutions and facilitate their adoption, keeping in mind these might require re-skilling, up-skilling of team members.

Project management: planning, organising, controlling the resources and activities required to complete the specific installation projects within a predetermined time frame and budget. It involves defining the scope of the projects, setting clear goals and objectives, identifying the resources and tasks required to complete the projects, monitoring, and controlling the progress to ensure that they are completed on time and within budget, communicating with the customers and any relevant organisational departments. Continually improve the process based on experience and resources available.

Key Indicators (3rd level)

The behavioural indicators associated with the first level of the selected competencies, used to showcase the requirements for needed for the successful employment of the knowledge and skills. This level can be associated with general managers, directors, owners/founders, HR managers.

Problem solving/troubleshooting: identifies a problem/issue related to the company and/or its business model; develops a plan to solve it that makes the business more adaptable and/or more profitable/efficient; utilizes prior experience and knowledge of him/herself and his/her team; breaks the issue into smaller pieces from previous experience and combines it with the feedback from other parts of the organisation; learns and implements strategies to prevent the issue from re-occurring or solves the issue at its core.

Digital: advanced knowledge of digital technologies employed in the installation process (hardware and software) and how it is associated with other processes/teams in the company, high competencies in digital communication and marketing, as well as the tools associated with them, ability to assess, learn and implement new processes and digital tools while making an informed decision on their usefulness based on user feedback and company metrics. Liaising with specialized staff working in the hardware and software fields (internal or external).

Preventative maintenance: plans and adapts the resources (hardware, HR, and software) for the maintenance required, tracks and adapts to any relevant trends, liaises with team leaders to offer ancillary services, adapts resources to changing requirements and tools, implements digital tools and personnel to streamline the process and costs.

Calibration and testing: extensive knowledge of current and future (planned) operating parameters and standards associated with them, ability to set up and maintain services and personnel associated with a high standard of calibration and testing requirements, gather the data from past and current installations to determine system performances and trends that can assist in choosing the most efficient (tailored and cost effective) system to the end users, adapting the company to use the most suitable systems and means of testing/calibrating them available.



Lifelong learning: active participation in continues training as well as adaptability in using newly learned skills and knowledge in day-to-day work that is coupled with identifying missing knowledge and flagging it for future development. Actively identifying and learning resources and tools that can assist the team in their work and liaising with HR resources to plan such trainings. Trainings focusing on technical aspects, management, customer management, planning and resource allocation, developments and trends in the field, business development.

RES Integration: high technical, economic, and regulatory understanding of the integration of HP installations into RES generation and storage, as well as the existing regional/national standards of such an integration. Ability to gather, accurately evaluate requirements and match with cost efficiency and other resources. Ability plan projects that have an integration component and develop systems to make the process streamlined and cost-effective, while steadily improving services in ancillary systems and services.

Health and safety: fully up to date with the necessary health and safety provisions, protocols, standards and provisions for the installation, maintenance, and decommissioning processes of HPs and those of ancillary activities, as well as record keeping and certification processes. (Such provisions might differ from country to country). Fully up to date in any other supporting activities from a health and safety point of view (e.g., F-gas, electrical), as well as regulations relating to team working conditions and those of supporting/external teams of the project (e.g., construction, excavation). Ability to combine experience with regulations and standards as to streamline a safe, efficient process. Ability to underline the need for further health and safety required certifications as to expand the scope of work. From a business and cost-effectiveness perspective and to liaise and appoint staff/teams solely tasked with health and safety matters.

Customer communication: ability to liaise with end-users of large projects and to explain the installation process (in a non-technical way if necessary) in face-to-face or other types of interactions (e.g., via phone), as well as the timeline, resources, steps, and anything else related to the process (knowledge on how to make accurate estimates and use the in-house experts available as well as to adapt and improve for each project). Interpersonal and a customer orientated approach that complements the technical and business side. Ability to maintain staff that use new communication tools, undertake customer centric trainings, and liaise with other teams inside the organisation (e.g., communication department). Recognize the added value these types of interactions and knowledge bring to the business (improving customer satisfaction, building loyalty, and increasing the likelihood of repeat/expanded business).

Customer management: knowledge and willingness to improve one's customer service skills and knowledge by gathering technical, business and project management abilities and utilising them, while constantly improving such related skills in the organisation. Ability to analyse customer feedback and to utilise it towards the improvement of services and products, to employ a CRM (and manage a team responsible for its development), to spot trends and issues and take steps to alleviate them. Based on staff first-hand experiences with costumers and the installation process (as well as related ancillary activities), to implement improvements to the process and services as well as incentives/special promotions or new products/services and link them to business development.

Client focus: propensity to use one's business and organisational skills to prioritise the needs and preferences of the customer via the creation of communication tools in a timely and



accurate manner, linking the information coming from them with the processes of the organisation, supervising the project planning beforehand, and using the experience gained from past similar projects (if available) as examples to achieve the desired results. This competency requires knowledge of the communication tools and systems used by the organisation and how they function, as well as knowledge of the process to create customer support/loyalty programmes, and how such programmes link to the business model of the organisation.

Influencing: planning and implementation of clear and effective communication related organisational best practices towards the end-users based on technical, economic, business, and planning knowledge. Provided in a detailed manner and in a way that helps building rapport and trust between the organisation and its customers. Motivation into making the projects sustainable, persuasion based on experience dealing with other service providers, and a clear overall decision-making and planning process, negotiation skills that assure a fair outcome for the company and end user, leadership of the team in encouraging the same approach in all services.

Interpersonal relationships: establishing a mutual beneficial rapport with the clients (and organisational departments) based on clear and effective communication that is managing expectations and is based on experience (support from specialised teams should be sought if necessary). Ability to build and maintain positive relationships before, during and after the project, as well as to explain the process, decision-making and any potential issues to the customer or internally in the organisation in an effective way. This should be combined with the goals and practices of the organisation, from a client focused and business viewpoint.

Promotional/Sales: ability to identify potential customers by presenting the benefits of a product, service, and the organisation, negotiating prices (with support from other departments of the organisation) and terms (with support from other departments of the organisation), and closing the sale (while reporting the results to any other related departments). Capacity to explain in detail the products clearly and effectively, services and the timeline associated with providing them. Recognising the part that sales, customer satisfaction/return customers have in the sustainable functioning and growth of the organisation. Extended knowledge of the building relationships with customers process, the incentives or discounts, loyalty schemes and extended services/guarantees that the organisation is currently/planning to offer (as well as adapting them to market conditions).

Financial management: extensive pricing knowledge of the products and services offered by the organisation, as well as ability to offer alternatives between them and their calculation. Financial management in the planning and execution of each project and budgeting for the organisation (yearly or best practice), based on forecasting, market data, and financial analysis. Supervising (with the support of specialised departments) of overall budgeting for staff and expenses of the organisation. Ability to resolve potential financial issues and setbacks related to the project and to implement solutions/tools to resolve them, while always striving for financial efficiency and performance and liaising with other specialised staff or companies (e.g., auditors, accountants).

Resource management: ability to plan, organise and assess the resources needed for the adequate functioning of the organisation (as well as potential resources and tools needed to improve its processes). This includes: materials, equipment, time, HR resources, IT tools and



logistics. Effectively assessing and monitoring resource use in a timely manner and liaising with other specialised departments or staff, identifying any trends that can support a more effective process. Consider the knowledge and skills of team members and other departments as for the most effective use of specialised resources, as well as implement programmes aimed at improving such intangible skills. Ability to prioritise the use of resources, adequately allocating them to different projects, departments, and activities as per having an overall knowledge of all projects taking place in the organisation.

Commercial awareness: understanding of the business environment in which the organisation operates, and the organisational competitive advantage/s as to further improve its positioning in relation to competitors. Analyse data, inputs and trends from customers and internal departments, and communicate it effectively. Planning the strategies and practices that are used to create and sustain a competitive advantage and taking them into account as to make informed decisions. Interpret data and information about the market, client preferences/trends and industry, while adapting to changing circumstances. Decision-making abilities which drive the selection/adoption of long-term strategies and initiatives. managerial competencies that include: leadership, strategic planning, organisational management (e.g., the ability to understand business benefits and business risks of model-based workflows).

Innovation and entrepreneurship: create, plan, and implement new ideas, products, and/or services. Analyse data and deploy new or improved products, services, processes, or technologies that meet the needs of customers or solve problems in a new, more efficient, or different way. Introduce new ideas, apply existing knowledge in new contexts, combine different ideas or products in novel ways. Identify a business opportunity and take the necessary steps to turn that opportunity into a successful product/service that complements or improves upon existing ones. Analyse the market and identify a need or gap in it, developing a product or service to meet that need, and creating and implementing a plan to bring the product or service to market.

Negotiation and decision making: communicate clearly and effectively, be able to listen to and understand the perspectives of others from the organisation, suppliers, and clients, analyse and objectively evaluate information to take informed decisions. Link the decision taken with the overall goals of the organisation and plan for any issues that might arise, continually gather data from departments in the organisation. Able to think critically and creatively, to identify and weigh the potential risks and benefits of different options. Exchange ideas and data, explore different options and alternatives (considering the pros and cons of different options, and selecting the one that best meets the needs and goals of the decision maker), develop mutually acceptable agreements between the company and clients, resolve conflicts.

Perseverance: ability to continue working towards the organisational goals or objectives despite setbacks or difficulties, while maintaining motivation and focus (for individual and team members). It involves persistence, determination, and the ability to keep going, while having a positive attitude and being able to maintain a sense of perspective, even when things do not go as planned.

Coaching and mentoring: ability to engage in developmental activities and to receive support for achieving one's goals, while improving the performance of the organisation. Inclination to identify one's areas of improvement (as well as those of the organisation) and to take the



necessary steps to upgrade skills, knowledge, or performance in that area/s. Ability to set and achieve goals, provide feedback and guidance. Be a mentor and devote resources to specialised staff, that provides guidance, support, and advice to a less experienced individual, a role model, advisor, that helps the mentee to develop their skills and knowledge, and to navigate their career. This includes administration competencies: the day-to-day organizational activities as required to meet and maintain strategic objectives. administration competencies include contract administration, HR and recruiting.

Adaptability: ability to adjust the organisation to new situations or demands. It involves being flexible, open-minded, and able to adapt one's behaviour (as well as that of the organisation) or approach in response to changing circumstances. The ability to learn and adapt quickly, to be resilient in the face of change, and to be open to new internal and external ideas, processes, and approaches that can have a significant improvement to the organisational performance in changing environments/market conditions.

Teamwork: capacity of working collaboratively in a group as to achieve the organisational objectives via shared responsibility and accountability. Ability to leverage the different skills and expertise of staff, and to communicate effectively, being able to listen and understand the perspectives of others. Openness to the ideas and contributions of staff, as well as a perspective on how these suggestions fit into the operations of the organisation. Ability to resolve conflicts in an equitable and transparent way.

Delegate: ability to effectively identify the tasks and responsibilities that can be delegated, choosing the right person in the organisation for the task after analysing their workload and skills. Provide clear instructions, timeline and expectations with support and guidance as needed. Follow up and monitor the progress of the delegated tasks to ensure that they are completed effectively, while providing feedback.

Logistics: set up the skills necessary (or a specialised department) for the logistical aspects of the organisation. Be aware of the various activities and resources that are required to transport and distribute products, materials, and services, as well as the time needed to do so. Constantly improve (based on internal and external factors/suggestions) the logistical chain as to reduce costs, improve customer satisfaction, and increase organisational competitiveness.

Change management: ability to implement planned changes at the organisational level, identifying the need for change, assessing the impact of the change, developing a plan for implementing the change, communicating the change to stakeholders, and monitoring and reviewing the progress of the change. Actively investigate new solutions (changing market conditions, customer needs, costs, logistical, and technological developments) and facilitate their adoption, keeping in mind these might require re-skilling/up-skilling of staff.

Project management: planning, organising, controlling the resources and activities required for the functioning of the organisation, within a predetermined budget. It involves defining the goals of the organisation, setting clear goals and objectives, identifying the resources and tasks required to achieve them, monitoring, and controlling the progress to ensure that they are completed on time and within budget, communicating with the relevant staff. Continually improve the process based on experience, resources available and external factors.

5.5. Notes to be further explored

The work and data gathering that went into this deliverable, has also pointed towards aspects of it that need further development, these are:

The different competency levels need to be tested and validated by external stakeholders.

Further work with training providers on the competency framework validation needs to be pursued; closer alignment with National Heat Pump Associations (members of EHPA) in training, qualifications and mutual recognition is needed (indeed this was suggested by the National Heat Pump representatives).

The addition of other clusters can be considered (e.g., value chain logistics, manufacturing including robotics and 3D printing, research and development) as per a complete value chain approach.

Collaboration with likeminded projects was pursued, however, new relevant projects that can be built upon are steadily appearing.

Direct inputs and examples of manufacturer provided trainings have been included in the deliverable, but further work is needed to fully appreciate the wealth of capabilities offered directly by these companies.

EHPA does not currently have Heat Pump National Associations in all countries of Europe, and as more are created and grow, a better picture of variables and needs can be achieved.

6. References

- EU Competency Framework for the management and implementation of the ERDF and Cohesion Fund - User guidelines for the EU Competency Framework and Self-Assessment Tool V1 3rd November 2017 (https://ec.europa.eu/regional_policy/en/policy/how/improving-investment/competency/)
- The Competency Framework - A guide for IAEA managers and staff (<https://www.iaea.org/sites/default/files/18/03/competency-framework.pdf>)
- Talent.oecd – Competency Framework (https://www.oecd.org/careers/competency_framework_en.pdf)
- SHRM Competency Model (<https://www.shrm.org/learningandcareer/career/pages/shrm-competency-model.aspx>)



7 Annexes

7.1. Partner updated survey results

<i>Respondent ID</i>	2	3	4	5	6	7	8	9	10
<i>What level does your company operate on?</i>	National	Local	Local	International	Local	National	International	Regional; National	National; European

<i>In which country(s) are you operating in?</i>	Ireland	Ireland	Albania	Several countries	Italy	Romania	Several countries	Serbia; Bosnia-Herzegovina ; Montenegro; Macedonia	Greece
<i>What is the size of the workforce of your entity?</i>	1000 and more	10 to 50	10 to 50	10 to 50	1 to 10	50 to 500	10 to 50	1 to 10	50 to 500
<i>What main field/s below best describe your job position?</i>	Planning/Design staff	Installation staff - Non-residential sector focused	Maintenance and Operation staff - Residential sector focused	Manufacturing staff; Distribution staff - Non-residential sector focused	Planning/Design staff	Energy Company staff; Research staff	Research staff	Planning/Design staff; Installation staff - Residential sector; Installation staff - Non-residential sector; Maintenance and Operation staff - Residential sector; Energy Company staff	Research staff
<i>Do you take part in other activities?</i>	Financial management	Meeting new clients; Establishing business partnerships; Liaising with sectorial associations; Liaising with suppliers; Liaising with local government	Hardware/ Software implementation	Advise Renewable energy companies to use HP	Marketing; Liaising with suppliers	Establishing business partnerships; Liaising with local government; Liaising with sectorial associations; Marketing; Hardware/ Software implementation	Marketing; Meeting new clients	Liaising with local government; Liaising with sectorial association; Establishing business partnerships ; Liaising with suppliers	Establishing business partnerships
<i>Marketing</i>	High	High	Essential	Essential	Medium	High	Medium	High	Low
<i>Meeting new clients</i>	Low	High	Essential	Essential	High	Essential	High	Essential	Medium
<i>Liaising with suppliers</i>	High	High	High	High	High	Medium	High	Medium	High

<i>Financial management</i>	Medium	Essential	Essential	High	Medium	High	High	High	Medium
<i>Human Resources / Recruitment</i>	High	High	High	Medium	Low	Essential	High	High	High
<i>Hardware / Software implementation</i>	High	High	Medium	Medium	Essential	Essential	Essential	High	Essential
<i>Establishing business partnerships</i>	High	Medium	High	Essential	Medium	Essential	High	Essential	High
<i>Liaising with sectorial associations</i>	High	Medium	Medium	Medium	Medium	High	Medium	Essential	High
<i>Liaising with local government</i>	High	Medium	Medium	Medium	High	Essential	Medium	High	Medium
<i>Liaising with start-ups / new technology providers in the sector</i>	High	Medium	Medium	Low	Low	Essential	High	Medium	High
<i>What is the main mission of your organisation?</i>	Distribution – Residential sector focused	Installation - Non-residential sector;	Maintenance and Operation - Residential sector; Installation - Residential sector	Manufacturing; Maintenance and Operation - Residential sector; Research	Planning/ Design	Research ;Planning/Design; Installation - Non-residential sector; Energy Company	Research	Planning/ Design; Installation Non residential sector; Installation - Residential sector; Maintenance and Operation - Residential sector; Energy Company	Research
<i>What kind of HP technology are you installing/ manufacturing / developing?</i>	Water	Air	Air; Water	Water; Hybrid	Geothermal; Air; Hybrid	Geothermal; Hybrid	Diverse	Air; Geothermal; Water	Air; Geothermal; Water

Could you assess the demand level of the HP market in your geographical operating area?	4	4	5	4	5	4	4	3	5
What market changes do you experience or foresee for your area of work?		Government grants of up to 80% are planned to promote the installation of renewable energy systems heat pumps, solar, insulation, deep retrofit.		Highly interest growth		A high demand for HP	Low temperature storages	Further growth in the turnover of goods and services on the market, and the inclusion of even more factors	Increase of combinations of solar thermal with heat pumps
Regarding technical skills?	Satisfying	Lacking	Average	Great	Lacking	Great	Satisfying	Satisfying	Average
Regarding customer orientated competencies ?	Satisfying	Average	Average	Average	Poor	Great	Average	Satisfying	Lacking
Regarding business competencies ?	Satisfying	Average	Average	Average	Average	Satisfying	Satisfying	Average	Average
Regarding organisational competencies ?	Satisfying	Average	Average	Average	Average	Great	Satisfying	Great	Satisfying
Regarding health and safety competencies ?	Satisfying	Average	Average	Average	Average	Satisfying	Average	Average	Lacking

<i>Please, could you give us further information regarding the quality and availability of Heat Pump-specialized workforce in your geographical operating area ?</i>		DKIT is my local technical college. They are running various heat pump, solar and renewable energy courses.				Not much, we have to specialize people		The coverage of the installers is quite good for now, as is the coverage of the designers. The Faculty of Mechanical Engineering also educates good staff, there is also a significant staff of drillers in Serbia, who develop GSHP projects	
<i>Technical skills?</i>	Satisfying	Average	Great	Great	Great	Great	Average	Great	Great
<i>Customer orientated competencies ?</i>	Satisfying	Average	Great	Great	Great	Great	Great	Great	Average
<i>Business competencies ?</i>	Satisfying	Average	Great	Great	Average	Great	Satisfying	Satisfying	Satisfying
<i>Organisational competencies ?</i>	Satisfying	Average	Satisfying	Great	Average	Great	Satisfying	Satisfying	Satisfying
<i>Health and safety competencies ?</i>	Satisfying	Average	Satisfying	Great	Average	Satisfying	Satisfying	Satisfying	Satisfying

Please could you give us further information regarding competencies and skills that would you consider essential in a scenario of raising demand for your services?		Up skilling the workforce to improve retrofit outcomes. Monitor the planning, installation, commissioning and operation of the work. Don't just install and disappear.						In our region, the popularity of heat pumps is not so widespread, so we should certainly work on expanding awareness and the benefits that the implementation of heat pumps brings.	
Regarding technical skills?	Good	Good	Instrumental	Light		Instrumental	Good		
Regarding customer orientated competencies ?	Good	Good	Instrumental	Light		Good			
Regarding business competencies ?	Good	Good	Instrumental	Light		Good			
Regarding organisational competencies ?	Good	Good	Instrumental	Light		Instrumental			
Regarding health and safety competencies ?	Good	Good	Instrumental	Light		Good			

<i>If you are using a trainer(s) or training institution(s) regarding your HP activities, please could you give us your insight on the impact of your associations with this trainer(s) or training institution(s) on your activity?</i>		I found the trainers in DKIT to be very passionate about retrofits and renewable energy installations.				We had many years 2 twice a year training with HP producer - great job!			
<i>Regarding technical skills?</i>	Satisfying	Average	Average	Satisfying	Satisfying	Satisfying	Average	Average	Satisfying
<i>Regarding customer orientated competencies ?</i>	Satisfying	Average	Average	Lacking	Satisfying	Average	Average	Average	Average
<i>Regarding business competencies ?</i>	Satisfying	Average	Average	Lacking	Average	Satisfying	Satisfying	Lacking	Lacking
<i>Regarding organisational competencies ?</i>	Satisfying	Average	Average	Lacking	Average	Great	Satisfying	Average	Average
<i>Regarding health and safety competencies ?</i>	Satisfying	Average	Average	Satisfying	Average	Average	Lacking	Lacking	Satisfying

<p><i>Please could you give us further information regarding issues related to the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area?</i></p>		<p>Upskilling trades people is vital for the success of renewable retrofit projects. Trades people are busy. I recommend that training takes place during working hours and employers pay their wages against going to night classes at own expense.</p>					<p>In the previous period, institutions were less involved in this process about heat pumps. Gas boiler were most popular. There has been noticeable progress lately as the popularity of heat pumps grows, so more and more factors are involved in processes of all forms.</p>	
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<i>Please could you give us your insights on the public education /certification schemes available in your geographical operating area? Would you consider these certification schemes to be easily accessible?</i>		Yes at DKIT	Energy certification of the building	Not specific. Engineering Msc and Refrigeration technicians	not requested	Not much public education/certification schemes available in our geographical operating area! => these certification schemes are not easy accessible	Not easy enough	In the previous period, they were not so popular. But lately there has been noticeable progress.	Not formally available. Depending on the heat pump manufacturer/supplier.
<i>Would you consider that the public authorities in your geographical area are sufficiently supporting up skilling/training policies ? Could you highlight policy/legal barriers that hinder the training of heat pump specialised workforce in your geographical area?</i>		N/A		No	No	The public authorities in our geographical area are not supporting up skilling / training policies <= disinterest		In any case, the ministry as the main institution should be the initiator, and in that segment the biggest step forward could be made	Installation not needed to be made by certified technicians for most of the heat pumps/refrigeration equipment. Only few (big) HP manufacturers have such requirement.

(If your organisation is operating in several countries) please could you rate the level of challenges with training/ certification compatibilities of HP-specialised workforce in the different geographical areas your organisation is operating in?	5			2					
(If your organisation is operating in several countries) please could you give us more information regarding main challenges your organisation is facing based on the previous question?								Since we operate in countries in the region where the situation regarding heat pump awareness is roughly the same. For now we have no problems, probably entering the market of the European Union would bring big obstacles.	

<p><i>Could you give us your opinion of the current and future evolution of national (and European if your organisation is active in several countries/ regions) policies related to the training and upskilling of heat pump-specialised workforce? What are the main challenges that policy makers must address in priority?</i></p>		<p>Heat pumps require electricity to operate. Preferably this electricity will NOT be generated using fossil fuels.</p>	<p>Funding and know-how</p>	<p>It would be totally necessary</p>	<p>have an engineer to choose the right model each time</p>	<p>The current evolution is almost 0 and the future evolution of national policies related to the training and skilling of Heat Pump - specialised workforce must follow the increase demand on the market!</p>	<p>Lifecycle analysis</p>	<p>For now, it is still market oriented. The Ministry and state institutions still do not recognize the great importance and have no need to prioritize training. For now, the main initiators of training are companies that need to expand their staff in 90% of cases.</p>	<p>Such evolution is very slow, since it requires technicians to be trained and gain some hands-on experience. It could take several months before the results become noticeable.</p>
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Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training?		I think after sales monitoring of installations is important to ensure efficient operation of the system. I suspect that, in many cases, solar is installed but not operating to its full potential. "Install and go". The same is probably true about heat pumps. The installation needs to be fine tuned to the specific site over time.	Involvement of Albania in these projects	Including at actual education	train also the customer	A coherent package of measures at European level including best practice rules	Environmental issues, e.g. ground water treatment	My opinion is that primarily the technology applied to heat pumps should be uniform, to avoid the obstacles that each manufacturer brings with it. In that case, the trainings could be more massive and applicable. If this is not the case, then equipment producers should be more involved in training.	Technicians schools to add such training courses in their work program. Otherwise, big heat pump manufacturers could invest on creating such schools.
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Respondent ID	11	12	13	14	15	16	17	18	19	20
What level does your company operate on?	Regional;International;	International;	International;	Regional	International;	National;	Local	Local; Regional; National; European; International;	European	European; National; Regional; Local
In which country(s) are you operating in?	Several countries: Kenya East Africa, Guatemala Central America	Several countries	Several countries	Austria	Germany, Austria, Switzerland	Germany	Several countries: Germany	France	Several countries: Spain, Germany	Several countries: Norway, Sweden, Netherlands
What is the size of the workforce of your entity?	1 to 10	500 to 1000	1 to 10	1 to 10	50 to 500	500 to 1000	500 to 1000	10 to 50	1 to 10	10 to 50
What main field/s	Research staff	Manufacturing staff	Energy company staff	Planning/ Design staff	Installation staff – Residential	Distribution staff –	Manufacturing staff; Planning /	Manufacturing staff; Planning/	Research staff	Energy company staff

<i>below best describe your job position?</i>					sector; Energy company staff	Non – residential sector	Design staff; Installation staff – residential sector;	Design staff: Installation staff – Non – residential sector		
<i>Do you take part in other activities?</i>	Advise Renewable energy companies to use HP;	Marketing; Liaising with suppliers;	Establishing business partnerships; Liaising with local government; Liaising with sectorial associations; Marketing; Hardware/Software implementation;	Marketing ;Meeting new clients;	Liaising with local government; Liaising with sectorial associations; Establishing business partnerships; Liaising with suppliers;	Establishing business partnerships;	Hardware/Software implementation;	Meeting new clients; Marketing ; Human Resources/ Recruitment; Financial management; Establishing business partnerships; Liaising with suppliers; Liaising with sectorial associations; Liaising with local government;	Financial management; Human Resources / Recruitment; Hardware/ Software implementation	Financial management; Human Resources/ Recruitment; Hardware /Software implementation; Establishing business partnerships; Liaising with local government; Liaising with sectorial associations;
<i>Marketing</i>	Medium	High	High	Medium	Medium	Essential	Essential	Medium	Low	Medium
<i>Meeting new clients</i>	High	High	Medium	Medium	Medium	Essential	High	Essential	Medium	Essential
<i>Liaising with suppliers</i>	Essential	High	High	High	Essential	High	Medium	High	Medium	Essential
<i>Financial management</i>	Essential	High	Low	Low	Medium	Medium	High	High	Low	Essential
<i>Human Resources / Recruitment</i>	Medium	High	Medium	High	Medium	Low	Essential	High	Low	Essential
<i>Hardware / Software implementation</i>	Medium	High	High	High	High	Medium	High	Low	Medium	High
<i>Establishing business partnerships</i>	Essential	High	High	Medium	Essential	Essential	Low	Essential	High	High

<i>Liaising with sectorial associations</i>	Low	High	High	Medium	Essential	High	Medium	Medium	Medium	Medium
<i>Liaising with local government</i>	Essential	High	High	Medium	Essential	Low	Low	High	Medium	Low
<i>Liaising with start-ups / new technology providers in the sector</i>	Essential	High	Medium	Medium	High	Low	Essential	Low	High	Low
<i>What is the main mission of your organisation?</i>	Research; Planning/ Design; Optmization of renewables with HP;	Research; Manufacturing; Planning/ Design; Distribution - Non-residential sector; Energy Company ;	Education	Planning/Design ; Installation - Residential secto;	Manufacturing; Maintenance and Operation - Residential sector;	Manufacturing ; Distribution - Non-residential sector;	Manufacturing ; Installation - Residential sector	Manufacturing; Planning/ Design; Distribution Nonresidential sector; Installation Nonresidential sector; Maintenance and Operation - Residential sector; Energy Company ;	Consultancy on Energy reduction;	Research ; Manufacturing; Planning/ Design; Installation - Non-residential sector;
<i>What kind of HP technology are you installing/ manufacturing / developing?</i>	Air; Geothermal; Water; Hybrid; Recovery of wasted energy	Air; Water; Hybrid	Air; Geothermal; Water; Education in all areas; Hybrid	Air; Geothermal	Air; Water; Hybrid	Air	Air; Water	Water; Steam production (near future)	Water; Industrial heat pumps	Steam producing
<i>Could you asses the demand level of the HP market in your geographical operating area?</i>	5	4	5	4	4	4	3	5	4	5
<i>What market changes do you experience or foresee for your area of work?</i>	Owners and managers will not change but energy prices will push the changes	move from gas boilers to hydronic heat pumps and hybrid systems	Lack of staff. Delay in components	enorme Nachfrage, Lieferschwierigkeiten	Expansion of company's own technology in the field of HP; Expanding industrial applications		Heat Pumps with low filling capacity	Changing from super heated water to steam generation. Wide spreading of technology in the industry	Much more implementation of industrial heat pumps in the food industry	Growth.

Regarding technical skills?	Satisfying	Great	Lacking	Lacking	Great	Satisfying	Average	Poor	Satisfying	Lacking
Regarding customer orientated competencies ?	Poor	Satisfying	Lacking	Lacking	Great	Lacking	Average	Lacking	Lacking	Poor
Regarding business competencies ?	Poor	Satisfying	Lacking	Lacking	Satisfying	Average	Average	Lacking	Lacking	Poor
Regarding organisational competencies ?	Poor	Great	Average	Lacking	Satisfying	Average	Lacking	Poor	Lacking	Poor
Regarding health and safety competencies ?	Poor	Average	Average	Lacking	Satisfying	Satisfying	Average	Lacking	Average	Lacking
Please, could you give us further information regarding the quality and availability of Heat Pump-specialized workforce in your geographical operating area ?	Refrigeration is over 100 years old, and the cycles are the same. So technical and support people is not difficult to find. The challenge is to find the people who can interface existing processes to new cycles of combined function and increased efficiency				The job market is very clear, there is a lack of young talent, since this technology is something complex, many applicants think it is too much				There are technical people but they are not skilled enough to think with customers that have low level of technical knowledge	
Technical skills?	Satisfying	Satisfying	Satisfying	Average	Great	Great	Great	Poor	Satisfying	Great
Customer orientated competencies ?	Average	Satisfying	Satisfying	Satisfying	Great	Great	Great	Poor	Satisfying	Great

Business competencies ?	Satisfying	Great	Satisfying	Average	Satisfying	Satisfying	Great	Poor	Average	Great
Organisational competencies ?	Average	Satisfying	Satisfying	Satisfying	Satisfying	Satisfying	Great	Poor	Average	Average
Health and safety competencies ?	Satisfying	Satisfying	Satisfying	Average	Satisfying	Average	Great	Poor	Average	Satisfying
Please could you give us further information regarding competencies and skills that would you consider essential in a scenario of raising demand for your services?	Understanding that an increase in energy efficiency is even more profitable than an increase in market share. Today that does not exist in the established industries.		Planning, design and installations of HP installations.						Linking all kind of different expertises, holistic approach	
Regarding technical skills?	Light		Light		Instrumental	Instrumental	Instrumental		Good	Light
Regarding customer orientated competencies ?	Light		Light		Instrumental	Good	Medium		Light	Anecdotal
Regarding business competencies ?	Light		Light		Instrumental	Good	Medium		Light	Anecdotal
Regarding organisational competencies ?	Light		Light		Good	Instrumental	Medium		Light	Anecdotal
Regarding health and safety competencies ?	Light		Light		Instrumental	Medium	Medium		Medium	Good
If you are using a trainer(s) or	It could help								Difficult to find trainers	

training institution(s) regarding your HP activities, please could you give us your insight on the impact of your associations with this trainer(s) or training institution(s) on your activity?										
Regarding technical skills?	Average	Satisfying	Lacking	Average	Great	Great	Average	Poor	Satisfying	Satisfying
Regarding customer orientated competencies ?	Average	Satisfying	Average	Average	Great	Great	Lacking	Lacking	Lacking	Poor
Regarding business competencies ?	Average	Satisfying	Lacking	Average	Great	Satisfying	Average	Lacking	Lacking	Poor
Regarding organisational competencies ?	Average	Great	Average	Average	Satisfying	Average	Average	Lacking	Lacking	Satisfying
Regarding health and safety competencies ?	Average	Satisfying	Lacking	Average	Great	Lacking	Lacking	Lacking	Lacking	Average
Please could you give us further Information regarding issues related to the training, competencies and skills of Heat Pump-specialized	Training is not for people who consider it just a job. It requires true vocation to teach and show how to think									

workforce in your geographical operating area?										
Please could you give us your insights on the public education/certification schemes available in your geographical operating area? Would you consider these certification schemes to be easily accessible?	Not important. Those are tools to increase employment	yes, in the Italian market it's easy to access to it	As we are in different countries this varies	mittel	in Germany, there are the classic training courses with a company certificate, followed by further qualification as a master craftsman or technician. This training is necessary because we have many standards and laws that must be known		The accessibility is ok.	The accessibility is ok.	No, difficult to find	No, difficult to find
Would you consider that the public authorities in your geographical area are sufficiently supporting up skilling/training policies? Could you highlight policy/legal barriers that hinder the training of heat pump specialised workforce in your geographical area?	Is not the job of public activities	yes	As we are in different countries this varies	nein Ankündigungsweltmeister und Umsetzungszweige	Yes the support is given, there is no alternative				No, difficult to find	
(If your organisation is operating in	5		5		5	1	3			

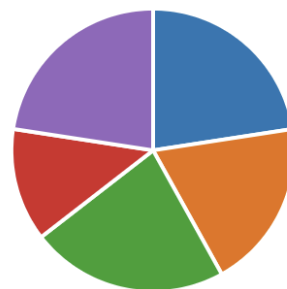
several countries) please could you rate the level of challenges with training/ certification compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in?										
(If your organisation is operating in several countries) please could you give us more information regarding main challenges your organisation is facing based on the previous question?	Understanding that an increase in energy efficiency is even more profitable than an increase in market share. Today that does not exist in the established industries.									
Could you give us your opinion of the current and future evolution of national (and European if your organisation is active in several countries/regions) policies related to the	The understanding that an increase in energy efficiency is even more profitable than an increase in market share. Today that does not exist in the established industries.	we are investing in training even though there is no significant aid from the governments in which we operate	Create international standards and education recognized in all countries	ausreichende finanzielle Förderung und Anreizsysteme	The entire market depends on the conditions under which the heat pumps can be operated. If the price of electricity remains high, it will be difficult to sell this technology. A state subsidy that is worthwhile for		flammable refrigerants must be on the focus	Definitely to foster the knowledge in industry about these technologies	Make it understandable for less technical people, define different levels of training	I cannot answer this

training and upskilling of heat pump-specialised workforce? What are the main challenges that policymakers must address in priority?					consumers would have to be introduced, as it only works in combination with PV system					
Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training?	The understanding that an increase in energy efficiency is even more profitable than an increase in market share. Today that does not exist in the established industries.	financial aid in relation to training courses	Please see above answer	europäisch einheitliche Zertifizierungssysteme (zB Euronormen)	Clear cooperation between heating and refrigeration technology. No demarcation but quick clear cooperation create.		future policy changes are not necessary	Definitely to foster the knowledge in industry about these technologies	Make it understandable for less technical people, define different levels of training	No

7.2. Partner updated survey results: Graphical representation and charts

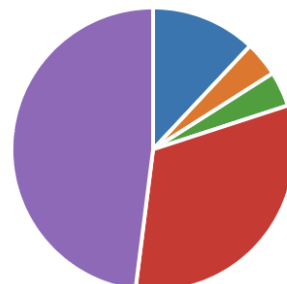
1. What level does your company operate on? (multiple answers possible)

Local	7
Regional	6
National	7
European	4
International	7



2. In which country(s) are you operating in? (multiple answers possible)

Ireland	3
Austria	1
Spain	1
Several countries (please speci...	8
Other	12



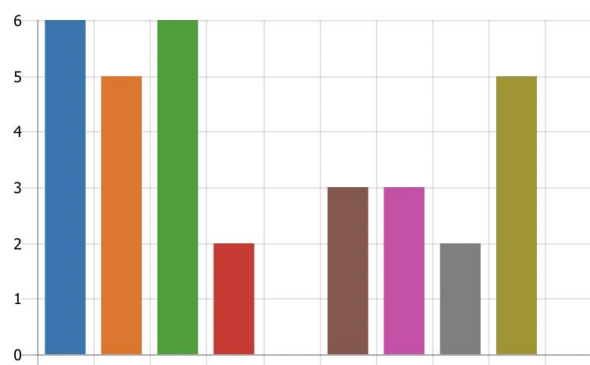
3. What is the size of the workforce of your entity? (single answer possible)

1 to 10	7
10 to 50	7
50 to 500	3
500 to 1000	3
1000 and more	1



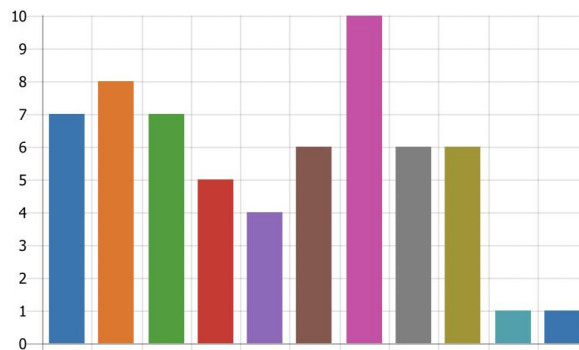
4. What main field/s below best describe your job position? (multiple answers possible)

Research staff	6
Manufacturing staff	5
Planning/Design staff	6
Distribution staff - Non-reside...	2
Distribution staff - Residential ...	0
Installation staff - Non-reside...	3
Installation staff - Residential s...	3
Maintenance and Operation st...	2
Energy Company staff	5
Public Body staff	0



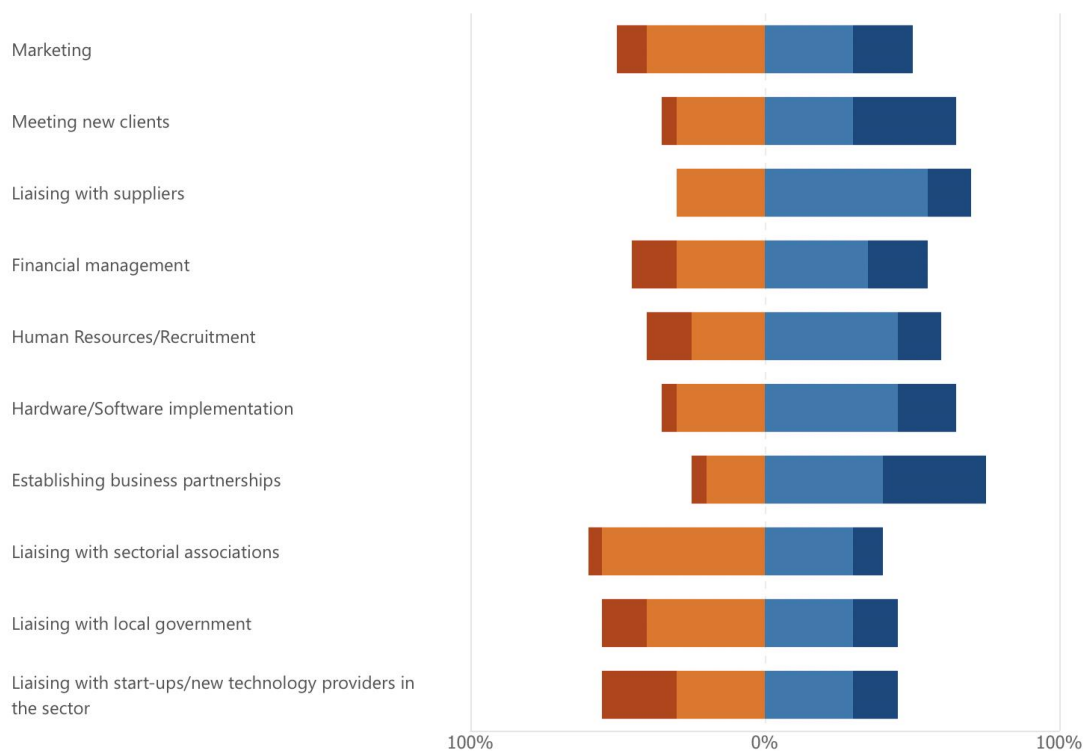
5. Do you take part in other activities? (multiple answers possible)

Marketing	7
Meeting new clients	8
Liaising with suppliers	7
Financial management	5
Human Resources/Recruitment	4
Hardware/Software implemen...	6
Establishing business partners...	10
Liaising with sectorial associati...	6
Liaising with local government	6
Liaising with start-ups/new tec...	1
Other	1



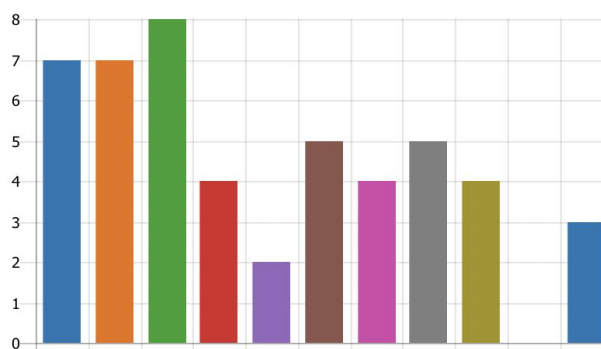
6. How would you rate the importance of each activities for your organisation ?

Low Medium High Essential



7. What is the main mission of your organisation ? (multiple answers possible)

Research 7
 Manufacturing 7
 Planning/Design 8
 Distribution - Non-residential ... 4
 Distribution - Residential sect... 2
 Installation - Non-residential s... 5
 Installation - Residential secto... 4
 Maintenance and Operation - ... 5
 Energy Company 4
 Public Body 0
 Other 3



8. What kind of Heat Pump technology are you installing/manufacturing/developing? (multiple answers possible)

Air	13
Geothermal	8
Water	12
Hybrid	7
Other	6



9. Could you assess the demand level of the Heat Pump market in your geographical operating area?

20
Responses

★★★★☆
4.30 Average Rating

10. What market changes do you experience or foresee for your area of work ?

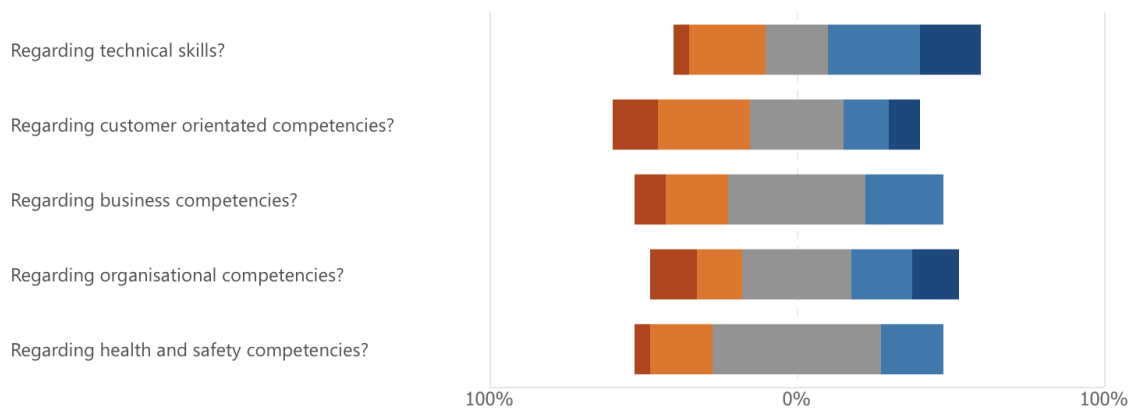
16
Responses

Latest Responses
"Growth."

"Much more implementation of industrial heat pumps in the food in..."
"Changing from superheated water to steam generation. Wide spre..."

11. Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area?

Poor Lacking Average Satisfying Great



12. Please could you give us further information regarding the quality and availability of Heat Pump-specialized workforce in your geographical operating area ? (optional)

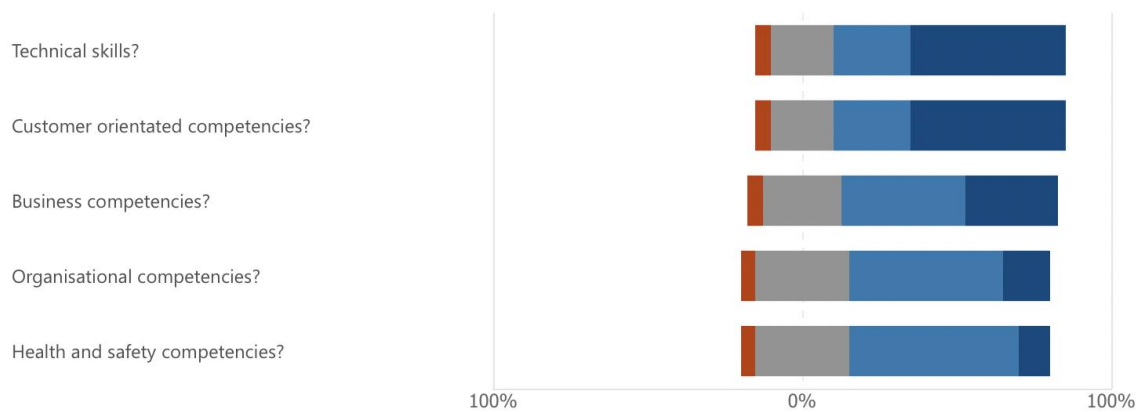
8
Responses

Latest Responses

"There are technical people but they are not skilled enough to think..."

13. What competencies and skills would you consider essential in a scenario of raising demand for your services ?

■ Poor ■ Lacking ■ Average ■ Satisfying ■ Great



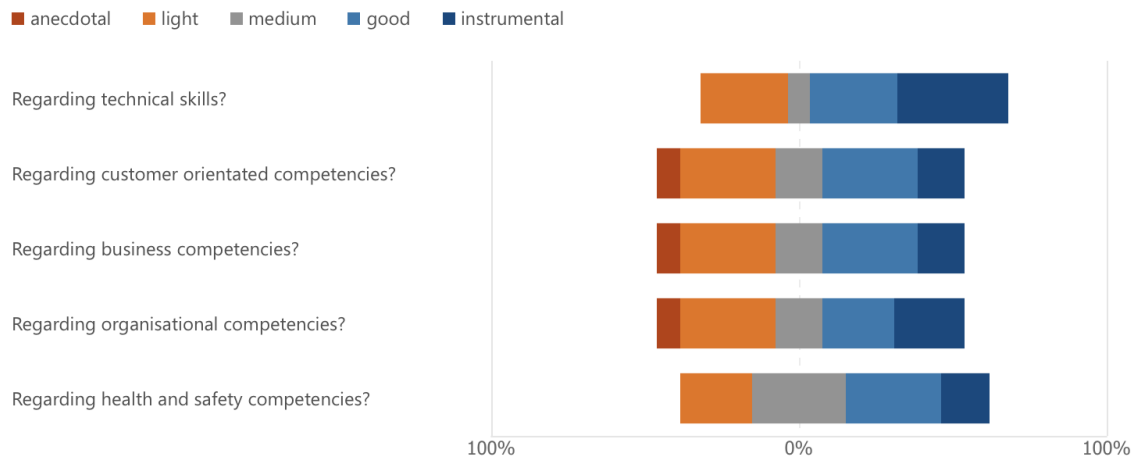
14. Please could you give us further information regarding competencies and skills that would you consider essential in a scenario of raising demand for your services ? (optional)

6
Responses

Latest Responses

"Linking all kind of different expertises, holistic approach"

15. If you are using a trainer(s) or training institution(s) regarding your heat pump activities, please could you rate the impact of your associations with this trainer(s) or training institution(s) on your activity ? (optional)

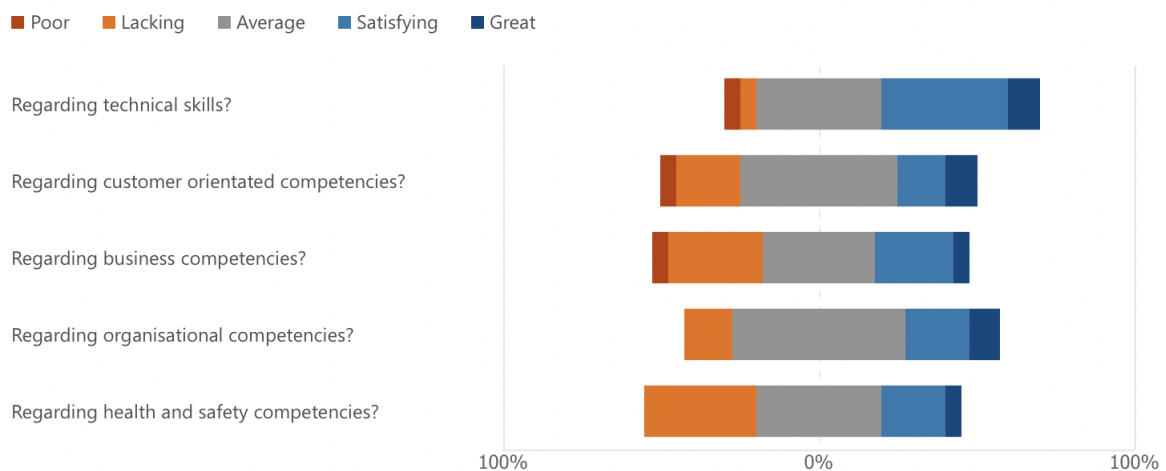


16. If you are using a trainer(s) or training institution(s) regarding your heat pump activities, please could you give us your insight on the impact of your associations with this trainer(s) or training institution(s) on your activity ? (optional)

5 Responses

Latest Responses
"Difficult to find trainers"

17. Please could you evaluate the level of difficulty of training your workforce in your geographical operating area ?





18. Please could you give us further Information regarding issues related to the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area ? (optional)

4

Responses

Latest Responses

19. Please could you give us your insights on the public education/certification schemes available in your geographical operating area? Would you consider these certification schemes to be easily accessible ?

20

Responses

Latest Responses

"Not all are easily available."

"No, difficult to find"

"no idea"

20. Would you consider that the public authorities in your geographical area are sufficiently supporting up skilling/training policies ? Could you highlight policy/legal barriers that hinder the training of heat-pump specialised workforce in your geographical area ?

13

Responses

Latest Responses

"No, difficult to find"

21. (If your organisation is operating in several countries) please could you rate the level of challenges with training/certification compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in? (optional)

8

Responses



3.75 Average Rating

22. (If your organisation is operating in several countries) please could you give us more information regarding main challenges your organisation is facing based on the previous question? (optional)

3

Responses

Latest Responses



23. Could you give us your opinion of the current and future evolution of national (and European if your organisation is active in several countries/regions) policies related to the training and upskilling of Heat Pump-specialised workforce? What are the main challenges that policymakers must address in priority ?

20

Responses

Latest Responses

"I cannot answer this"

"Make it understandable for less technical people, define different le..."

"Definitely to foster the knowledge in industry about these technolo..."

24. Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training?

20

Responses

Latest Responses

"No"

"Make it understandable for less technical people, define different le..."

"Definitely to foster the knowledge in industry about these technolo..."

Partner updated survey results: Survey questions

1. What level does your company operate on?
(multiple answers possible, mandatory answer)
Local
Regional
National
European
International

2. In which country (s) are you operating in?
(multiple answers possible, mandatory answer)
Ireland
Austria
Spain
Several countries (please specify which in the other section)
Other:

3. What is the size of the workforce of your entity?
(single answers possible, mandatory answer)
1 to 10
10 to 50
50 to 500
500 to 1000
1000 and more

4. What main field/s below best describe your job position?
(multiple answers possible, mandatory answer)
Research staff
Manufacturing staff



Planning/Design staff
Distribution staff – Non-residential sector focused
Distribution staff – Residential sector focused
Installation staff – Non-residential sector focused
Installation staff – Residential sector focused
Energy Company staff
Public Body staff

5. Do you take part in other activities?
(multiple answers possible, mandatory answer)

Marketing
Meeting new clients
Liaising with suppliers
Financial management
Human Resources/Recruitment
Hardware/Software implementation
Establishing business partnerships
Liaising with sectorial associations
Liaising with local government
Liaising with start-ups/new technology providers in the sector
Other:

6. How would you rate the importance of each activities for your organisation?
(mandatory answer)

Marketing:
Low
Medium
High
Essential
Meeting new clients
Low
Medium
High
Essential
Liaising with suppliers
Low
Medium
High
Essential
Financial management
Low
Medium
High
Essential
Human Resources/Recruitment
Low
Medium
High
Essential



Hardware/Software implementation

Low

Medium

High

Essential

Establishing business partnerships

Low

Medium

High

Essential

Liaising with local government

Low

Medium

High

Essential

Liaising with start-ups/new technology providers in the sector

Low

Medium

High

Essential

7. What is the main mission of your organisation?

(multiple answers possible, mandatory answer)

Research

Manufacturing

Planning/Design

Distribution - Non-residential sector focused

Distribution - Residential sector focused

Installation - Non-residential sector focused

Installation - Residential sector focused

Maintenance and Operation - Residential sector focused

Energy Company

Public Body

Other:

8. What kind of Heat Pump technology are you installing/manufacturing/developing? (multiple answers possible, mandatory answer)

Air

Geothermal

Water

Hybrid

Other:

9. Could you assess the demand level of the Heat Pump market in your geographical operating area?

(up to 5 stars, mandatory answer)



10. What market changes do you experience or foresee for your area of work?
(open question, mandatory answer)

11. Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area?
(mandatory answer)

Regarding technical skills?

Poor

Lacking

Average

Satisfying

Great

Regarding customer orientated competencies?

Poor

Lacking

Average

Satisfying

Great

Regarding business competencies?

Poor

Lacking

Average

Satisfying

Great

Regarding organisational competencies?

Poor

Lacking

Average

Satisfying

Great

Regarding health and safety competencies?

Poor

Lacking

Average

Satisfying

Great

12. Please could you give us further information regarding the quality and availability of Heat Pump-specialized workforce in your geographical operating area ?
(optional)

13. What competencies and skills would you consider essential in a scenario of raising demand for your services ?
(mandatory answer)

Technical skills?

Poor

Lacking

Average

Satisfying



Great
Customer orientated competencies?
Poor
Lacking
Average
Satisfying
Great
Business competencies?
Poor
Lacking
Average
Satisfying
Great
Organisational competencies?
Poor
Lacking
Average
Satisfying
Great
Health and safety competencies?
Poor
Lacking
Average
Satisfying
Great

14. Please could you give us further information regarding competencies and skills that would you consider essential in a scenario of raising demand for your services ?
(optional)

15. If you are using a trainer(s) or training institution(s) regarding your heat pump activities, please could you rate the impact of your associations with this trainer(s) or training institution(s) on your activity ?
(optional)

Regarding technical skills?
Anecdotal
Light
Medium
Good
Instrumental
Regarding customer orientated competencies?
Anecdotal
Light
Medium
Good
Instrumental
Regarding business competencies?
Anecdotal
Light



Medium
Good
Instrumental
Regarding organisational competencies?
Anecdotal
Light
Medium
Good
Instrumental
Regarding health and safety competencies?
Anecdotal
Light
Medium
Good
Instrumental

16. If you are using a trainer(s) or training institution(s) regarding your heat pump activities, please could you give us your insight on the impact of your associations with this trainer(s) or training institution(s) on your activity?
(optional)

17. Please could you evaluate the level of difficulty of training your workforce in your geographical operating area?
(mandatory answer)
Regarding technical skills?
Poor
Lacking
Average
Satisfying
Great
Regarding customer orientated competencies?
Poor
Lacking
Average
Satisfying
Great
Regarding business competencies?
Poor
Lacking
Average
Satisfying
Great
Regarding organisational competencies?
Poor
Lacking
Average
Satisfying
Great
Regarding health and safety competencies?



Poor
Lacking
Average
Satisfying
Great

18. Please could you give us further Information regarding issues related to the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area?

(optional – Open question)

19. Please could you give us your insights on the public education/certification schemes available in your geographical operating area? Would you consider these certification schemes to be easily accessible?

(Open question)

20. Would you consider that the public authorities in your geographical area are sufficiently supporting up skilling/training policies? Could you highlight policy/legal barriers that hinder the training of heat-pump specialised workforce in your geographical area?

(Open question)

21. (If your organisation is operating in several countries) please could you rate the level of challenges with training/certification compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in?

(optional – Open question)

22. (If your organisation is operating in several countries) please could you give us more information regarding main challenges your organisation is facing based on the previous question?

(optional – Open question)

23. Could you give us your opinion of the current and future evolution of national (and European if your organisation is active in several countries/regions) policies related to the training and upskilling of Heat Pump-specialised workforce? What are the main challenges that policymakers must address in priority?

(Open question)

24. Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training?

(Open question)

7.3. Survey template for external live events



Do you make a change in the HP industry training policies? Complete our poll!

HP4All brings together leading experts across Europe to set a better framework for *capabilities, skills and competencies* development within the Heat Pump sector and to ensure that the energy efficiency gains afforded by heat pumps are realised.

HP4All works both with the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.). This way, the project will help enhance, develop, and promote the qualifications required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings, bringing Europe to the forefront of the climatization sector.

A skills and competency framework comprises the package of skills and competencies needed to access a certain job/position. The data gathered as part of this poll will become part of a competency framework designed as part of a project deliverable (Heat Pump Skills and Competency Framework) prepared by the European Heat Pump Association (EHPA) in order to assess current and future need regarding the skills and competencies of the European HP workforce.

Please access the poll here:



7.4. Partner interviews: Templates and answers

Interview notes:

1. Name of interviewer: Carlos Garcia
2. Organisation conducting the interview: CTA
3. Date of the interview: 28/11/22
4. Format (online/offline): online
5. Did the interviewee provide their job description (Yes/No): Yes
6. Job title and name of the interviewee: Manel Servián. AFAR General Manager (Andalusian Heat Pump Manufacturers Association)
7. Area of work of the company s/he works for: Manufacturing & installing
8. Location of company: Lucena (Cordoba)

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<u>2</u>	<u>Acronyms and abbreviations</u>	150
<u>3</u>	<u>Description of Country specific competency environment</u>	Error! Bookmark not defined.
<u>4</u>	<u>Interview questions (please note that names, contact information or company will not be shared)</u>	150



Preparatory information

About the HP4All Project

HP4All brings together leading experts across Europe to enable capacity and skills development within the Heat Pump sector and to ensure that the energy efficiency gains afforded by heat pumps are realised. HP4All, following a holistic, systemic point of view, will work both with the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.). This way, the project will enhance, develop, and promote the skills required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings bringing Europe to the forefront of the climatization sector.

Skills and competencies definitions

Skills are the specific learned abilities that you need to perform a given job well. Examples, depending on the specific role, range from handling accounts and coding to welding or writing tenders. There is a distinction, however, to be made between hard skills and soft skills. Whereas a hard skill is a technical and quantifiable skill that a professional may demonstrate through their specific qualifications and professional experiences, a soft skill is a non-technical skill that is less rooted in specific vocations. An example of a hard skill, then, may be computer programming or proficiency in a foreign language, whereas a soft skill may be time management or verbal communication.

Competencies are the person's knowledge and behaviours that lead them to be successful in a job. Examples of competencies, then, include the improvement of business processes, strategic planning and data-based decisions. Competencies effectively explain how an individual's behaviours bring about the desired results in their role. As with skills, there are various types of competencies – including core competencies, which are those that any successful employee requires to rise through an organisation.

HAYS Recruiting experts worldwide

WHAT'S THE DIFFERENCE BETWEEN A SKILL AND A COMPETENCY?

Visit our blog to find out more
social.hays.com

SKILLS are the specific learned abilities that you need to perform a given job well, such as:

- 01 0110101 1000101 0101101 11 **CODING**
- HANDLING ACCOUNTS**
- WRITING TENDERS**

COMPETENCIES are the knowledge and behaviours that lead you to be successful in a job, such as:

- PROBLEM SOLVING**
- STRATEGIC PLANNING**
- NEGOTIATION**

The definitions and picture above are taken directly from a recruitment agency (<https://social.hays.com/>), highlighting the fundamental importance of organisations and



sectors to define what skills and competencies they need for a certain position and to design, maintain and run an internal competency framework.

Competency framework definition and purpose

A 'competency framework' is a structure that sets out and defines each individual competency (such as problem-solving or people management) required by individuals working in an organisation or part of that organisation²⁹.

Notes on data gathering purpose

The data gathered as part of this interview will become part of a competency framework designed as part of a project deliverable (Heat Pump Skills and Competency Framework) prepare by the European Heat Pump Association (EHPA)

Why do we ask the interviewee to provide their job description (if available)?

The job description of the interviewee (if available and suitable to be added to the deliverable document) would make it easier to capture the skills and competencies foreseen for the position, as well as other details that might not be mentioned in the interview or given too little attention.

Acronyms and abbreviations

EHPA	European Heat Pump Association
HP	Heat Pump
SME	Small to medium enterprise

Interview questions (please note that names, contact information or company will not be shared)

A. Framing the interviewed entity

What level does your company operate on? (Multiple answers possible)

Local

Regional

²⁹ Chartered Institute of Personnel and Development 2022, 151 The Broadway, London SW19 1JQ, UK Incorporated by Royal Charter, Registered Charity no. 1079797



National
European
International

In which country(s) are you operating in? (Multiple answers possible)

Ireland.

Austria.

Spain.

Other (please in which other State(s) are you operating in? EU wide, also third countries)

What is the size of the workforce of your entity? (Single answer possible)

1 to 10

10 to 50

50 to 500

500 to 1000

1000 and more (please state an estimation of the size of your entity)

What main field/s below best describe your job position? (Multiple answers possible)

Research staff

Manufacturing staff

Planning/Design staff

Distribution staff

Non-residential sector focused

Residential sector focused

Installation staff

Non-residential sector focused

Residential sector focused

Maintenance and Operation staff

Non-residential sector focused

Residential sector focused

Energy Company staff

Public Body staff

All the above

Do you take part in other activities? (Multiple answers possible)

Marketing

Meeting new clients

Liaising with suppliers

Financial management

Human Resources/Recruitment

Hardware/Software implementation

Establishing business partnerships

Liaising with sectorial associations

Liaising with local government

Liaising with start-ups/new technology providers in the sector

All the above

Other (please specify) ...

5A. How would you rate the above? (Insert rating matrix for survey and interview)

Activity	Importance
----------	------------



Marketing	Low	Medium	High	Essential
Meeting new clients	Low	Medium	High	Essential
Liaising with suppliers	Low	Medium	High	Essential
Financial management	Low	Medium	High	Essential
Human Resources/Recruitment	Low	Medium	High	Essential
Hardware/Software implementation	Low	Medium	High	Essential
Establishing business partnerships	Low	Medium	High	Essential
Liaising with sectorial associations	Low	Medium	High	Essential
Liaising with local government	Low	Medium	High	Essential
Liaising with start-ups/new technology providers in the sector	Low	Medium	High	Essential

What is the main mission of your entity? (Multiple answers possible)

Research

Manufacturing

Planning/Design

Distribution

Non-residential sector focused

Residential sector focused

Installation

Non-residential sector focused

Residential sector focused

Maintenance and Operation

Non-residential sector focused

Residential sector focused

Energy Company

Public Body

All the above

Other (please specify) ...

What kind of Heat Pump technology are you installing/manufacturing/developing? (Multiple answers possible)

Air

Geothermal

Water

Hybrid

Other (please state the type of technology used)

Could you assess the demand level of the Heat Pump market in your geographical operating area? (Open question) **Huge increase as from 2019, well above 30%, and even higher in the near future**



What market changes do you experience or foresee for your area of work? (Open question)
More complex systems are being demanded, smart control & maintenance is key, also environmental compliance

What competencies would you consider essential in a scenario of raising demand for your services? (Open question) Basic HP manufacturing (components manufacturing, assembly & testing) and maintenance skills -including electronics- are yet needed since workforce is hard to find. Digital components adjustment is increasingly important

Are you currently working with a Heat Pump training institution(s) or trainer(s)? Please could you give us your insights on the impact of your association with this training institution(s) or trainer(s)? (Open question) AFAR is currently undertaking on its own intensive basic and intermediate training courses (150-300 h. 50% practices) since other schemes are much less time responsive for the sector.

B. Upskilling, training schemes and availability of the work force

Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Low quality / unskilled; very difficult

Regarding customer orientated competencies? It is dealt with by sales agents

Regarding business competencies? n.a.

Regarding organisational competencies? n.a.

Regarding health and safety competencies? It is dealt with by other type of professionals

Could you highlight the main issues regarding the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Although AFAR is directly addressing it through its own courses, it is not enough to reap as many trainees as possible

Regarding customer orientated competencies? n.a.

Regarding business competencies? n.a.

Regarding organisational competencies? n.a.

Regarding health and safety competencies? it relates to other professionals.

Based on your knowledge, what kind of public education/certification schemes are available in your geographical operating area? Would you consider these certification schemes to be easily accessible? (Open question) Public schemes are not working, they are lengthy, non-practical and outdated. Upskilling is more needed than reskilling, recycling staff from other sectors is not working properly, better work with young staff (newcomers to the labour market) through apprenticeship schemes.

C. Policy/legal barriers to training and upskilling

Are there policy/legal barriers to the training and availability of Heat Pump-specialised workforce in your geographical operating area? (Open question) More financial and institutional support to practical schemes is needed, e.g, through contract bonifications for young apprentices



Are the policymakers sufficiently supporting current upskilling/training related policies regarding the Heat Pump sector? (Open question) **No, neither for experienced workers nor for newly contracted**

Are public subventions easily available to support the training of Heat Pump-specialised workforce? (Open question) **Not at all, they are even decreasing**

(If the entity is active in several regions/countries) Do you have any challenges with training compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in? What are the main challenges you are facing in that regard? (Open question) **In the EU the problem is similar, lack of staff and youth vocation. In less developed countries and emerging economies apprenticeship schemes work better.**

D. Future opportunities: perceived current and future evolutions and recommendation for future evolution

Could you give us your opinion of the current and future evolution of national (and European if the entity is active in several countries/regions) policies related to the training and upskilling of Heat Pump-specialised workforce? (Open question) **We do not know about them at national / regional level. At EU level we know about technical regulations and funding for RTDI projects, but not labour market supportive ones. The European Social Fund is thought to act this way, but we do not know about that, supporting schemes seem too vague.**

Could you highlight the main challenges that national (and European if the entity is active in several countries/regions) policymakers must address regarding the training of the heat-pump specialized workforce and skills/competencies acquisition processes? (Open question). **More practical apprenticeship courses overseen by industry combined with recruitment incentives linked to proven course goals achievement.**

Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training? (Open question) **As said above, hands-on training recruitment support measures.**

CTA Interview notes:

Name of interviewer: Carlos Garcia

Organisation conducting the interview: CTA

Date of the interview: 08/11/22

Format (online/offline): online

Did the interviewee provide their job description (Yes/No): Yes

Job title and name of the interviewee: Ana Maria Garcia. CEO at CONAIF (Spanish Installers Confederation)

Area of work of the company s/he works for: Installation

Location of company: Madrid

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BOOKMARK NOT DEFINED.		
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Preparatory information

About the HP4All Project

HP4All brings together leading experts across Europe to enable capacity and skills development within the Heat Pump sector and to ensure that the energy efficiency gains afforded by heat pumps are realised. HP4All, following a holistic, systemic point of view, will work both with the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.). This way, the project will enhance, develop, and promote the skills required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings bringing Europe to the forefront of the climatization sector.

Skills and competencies definitions

Skills are the specific learned abilities that you need to perform a given job well. Examples, depending on the specific role, range from handling accounts and coding to welding or writing tenders. There is a distinction, however, to be made between hard skills and soft skills. Whereas a hard skill is a technical and quantifiable skill that a professional may demonstrate through their specific qualifications and professional experiences, a soft skill is a non-technical skill that is less rooted in specific vocations. An example of a hard skill, then, may be computer programming or proficiency in a foreign language, whereas a soft skill may be time management or verbal communication.

Competencies are the person's knowledge and behaviours that lead them to be successful in a job. Examples of competencies, then, include the improvement of business processes, strategic planning and data-based decisions. Competencies effectively explain how an individual's behaviours bring about the desired results in their role. As with skills, there are various types of competencies – including core competencies, which are those that any successful employee requires to rise through an organisation.



HAYS Recruiting experts worldwide

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The definitions and picture above are taken directly from a recruitment agency (<https://social.hays.com/>), highlighting the fundamental importance of organisations and sectors to define what skills and competencies they need for a certain position and to design, maintain and run an internal competency framework.

Competency framework definition and purpose

A 'competency framework' is a structure that sets out and defines each individual competency (such as problem-solving or people management) required by individuals working in an organisation or part of that organisation³⁰.

Notes on data gathering purpose

The data gathered as part of this interview will become part of a competency framework designed as part of a project deliverable (Heat Pump Skills and Competency Framework) prepare by the European Heat Pump Association (EHPA)

Why do we ask the interviewee to provide their job description (if available)?

The job description of the interviewee (if available and suitable to be added to the deliverable document) would make it easier to capture the skills and competencies foreseen for the position, as well as other details that might not be mentioned in the interview or given too little attention.

Acronyms and abbreviations

EHPA	European Heat Pump Association
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³⁰ Chartered Institute of Personnel and Development 2022, 151 The Broadway, London SW19 1JQ, UK Incorporated by Royal Charter, Registered Charity no. 1079797



HP	Heat Pump
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SME	Small to medium enterprise
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Interview questions (please note that names, contact information or company will not be shared)

A. Framing the interviewed entity

What level does your company operate on? (Multiple answers possible)

Local

Regional

National

European

International

In which country(s) are you operating in? (Multiple answers possible)

Ireland.

Austria.

Spain.

Other (please in which other State(s) are you operating in ?)

What is the size of the workforce of your entity? (Single answer possible)

1 to 10

10 to 50

50 to 500

500 to 1000

1000 and more (please state an estimation of the size of your entity)

What main field/s below best describe your job position? (Multiple answers possible)

Research staff

Manufacturing staff

Planning/Design staff

Distribution staff

Non-residential sector focused

Residential sector focused

Installation staff

Non-residential sector focused

Residential sector focused

Maintenance and Operation staff

Non-residential sector focused

Residential sector focused

Energy Company staff

Public Body staff



All the above

Do you take part in other activities? (Multiple answers possible)

Marketing

Meeting new clients

Liaising with suppliers

Financial management

Human Resources/Recruitment

Hardware/Software implementation

Establishing business partnerships

Liaising with sectorial associations

Liaising with local government

Liaising with start-ups/new technology providers in the sector

All the above

Other (please specify) ...

5A. How would you rate the above? (Insert rating matrix for survey and interview)

Activity	Importance			
Marketing	Low	Medium	High	Essential
Meeting new clients	Low	Medium	High	Essential
Liaising with suppliers	Low	Medium	High	Essential
Financial management	Low	Medium	High	Essential
Human Resources/Recruitment	Low	Medium	High	Essential
Hardware/Software implementation	Low	Medium	High	Essential
Establishing business partnerships	Low	Medium	High	Essential
Liaising with sectorial associations	Low	Medium	High	Essential
Liaising with local government	Low	Medium	High	Essential
Liaising with start-ups/new technology providers in the sector	Low	Medium	High	Essential

What is the main mission of your entity? (Multiple answers possible)

Research

Manufacturing

Planning/Design

Distribution

Non-residential sector focused

Residential sector focused

Installation

Non-residential sector focused

Residential sector focused

Maintenance and Operation

Non-residential sector focused

Residential sector focused

Energy Company

Public Body



All the above

Other (please specify) ...

What kind of Heat Pump technology are you installing/manufacturing/developing? (Multiple answers possible)

Air

Geothermal

Water

Hybrid

Other (please state the type of technology used)

Could you assess the demand level of the Heat Pump market in your geographical operating area? (Open question) In the last three years it has experienced an enormous growth, well above 30%, and prospects are even much higher in the near future

What market changes do you experience or foresee for your area of work? (Open question) Extreme workforce shortages within a sector that is clearly dominated by micro-SMEs (less than 5 employees).

What competencies would you consider essential in a scenario of raising demand for your services? (Open question) Digital transformation is key to increase productivity, it is deemed that it could be improved above 30%, moreover, it is being increasingly demanded by public buyers and major customers

Are you currently working with a Heat Pump training institution(s) or trainer(s)? Please could you give us your insights on the impact of your association with this training institution(s) or trainer(s)? (Open question) CONAIF is currently undertaking basic and medium level training modules

B. Upskilling, training schemes and availability of the work force

Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Qualified albeit scarce and relatively aged workforce, needing training on last generation solutions, replacement rate very low and difficult

Regarding customer orientated competencies? After sales service could be improved, especially through acquiring digital skills

Regarding business competencies? As the sector is dominated by micro-SMEs only very basic business competences are overall in place

Regarding organisational competencies? As above

Regarding health and safety competencies? OSH issues are increasingly taken into consideration, the situation has clearly improved in the last ten years

Could you highlight the main issues regarding the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Although basic and specialised training is being conducted internally, a more coordinated approach with manufacturers training actions would clearly pay off



Regarding customer orientated competencies? **This is a cross cutting issue, not only related to HPs**

Regarding business competencies? **As above**

Regarding organisational competencies? **As above**

Regarding health and safety competencies? **For the time being it is reasonably covered**

Based on your knowledge, what kind of public education/certification schemes are available in your geographical operating area? Would you consider these certification schemes to be easily accessible? **(Open question) The Ministry of Education has got a set of accessible public education /certification schemes -currently under review-, for basic levels it seems to be reasonably appropriate, but it is lagging behind at specialised levels**

C. Policy/legal barriers to training and upskilling

Are there policy/legal barriers to the training and availability of Heat Pump-specialised workforce in your geographical operating area? **(Open question) No, it is more a matter of financial support for training. Professionals market demand from companies is now very high**

Are the policymakers sufficiently supporting current upskilling/training related policies regarding the Heat Pump sector? **(Open question) The HP sector is not so specifically addressed as required by the overall context**

Are public subventions easily available to support the training of Heat Pump-specialised workforce? **(Open question) Although there are some programmes / lines, they are not HP specific nor having significant budget for it. Industry associations are mainly tackling the issue, normally on their own.**

(If the entity is active in several regions/countries) Do you have any challenges with training compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in? What are the main challenges you are facing in that regard? **(Open question)**

D. Future opportunities: perceived current and future evolutions and recommendation for future evolution

Could you give us your opinion of the current and future evolution of national **(and European if the entity is active in several countries/regions)** policies related to the training and upskilling of Heat Pump-specialised workforce? **(Open question) Current policies are not in general HP specific, if the EU is going to pre-empt them more focused approaches would be needed.**

Could you highlight the main challenges that national **(and European if the entity is active in several countries/regions)** policymakers must address regarding the training of the heat-pump specialized workforce and skills/competencies acquisition processes? **(Open question). More financial support to dedicated training schemes and more visibility of the labour opportunities that building energy renovation and HP may provide.**

Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training? **(Open question) More intensive financial support and setting up and financial support of combined administration and industry driven training competence centres.**



CTA Interview notes:

Name of interviewer: Carlos Garcia

Organisation conducting the interview: CTA

Date of the interview: 07/11/22

Format (online/offline): online

Did the interviewee provide their job description (Yes/No): Yes

Job title and name of the interviewee: Ludwig Wagner. Board Member CNI (Spanish Confederation of Installers and Maintenance Professionals)

Area of work of the company s/he works for: Installation & Maintenance

Location of company: Madrid

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Preparatory information

About the HP4All Project

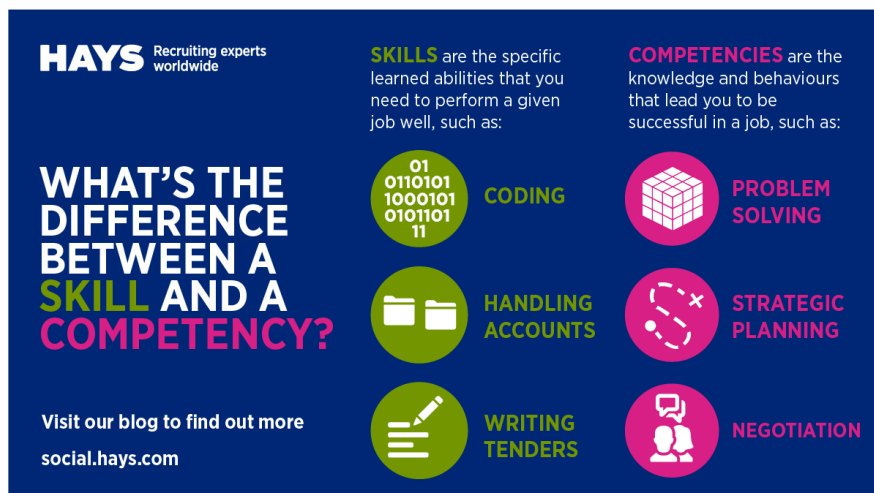
HP4All brings together leading experts across Europe to enable capacity and skills development within the Heat Pump sector and to ensure that the energy efficiency gains afforded by heat pumps are realised. HP4All, following a holistic, systemic point of view, will work both with the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.). This way, the project will enhance, develop, and promote the skills required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings bringing Europe to the forefront of the climatization sector.

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Competency framework definition and purpose

A 'competency framework' is a structure that sets out and defines each individual competency (such as problem-solving or people management) required by individuals working in an organisation or part of that organisation³¹.

Notes on data gathering purpose

³¹ Chartered Institute of Personnel and Development 2022, 151 The Broadway, London SW19 1JQ, UK Incorporated by Royal Charter, Registered Charity no. 1079797



The data gathered as part of this interview will become part of a competency framework designed as part of a project deliverable (Heat Pump Skills and Competency Framework) prepare by the European Heat Pump Association (EHPA)

Why do we ask the interviewee to provide their job description (if available)?

The job description of the interviewee (if available and suitable to be added to the deliverable document) would make it easier to capture the skills and competencies foreseen for the position, as well as other details that might not be mentioned in the interview or given too little attention.

Acronyms and abbreviations

EHPA	European Heat Pump Association
HP	Heat Pump
SME	Small to medium enterprise

Interview questions (please note that names, contact information or company will not be shared)

A. Framing the interviewed entity

What level does your company operate on? (Multiple answers possible)

Local

Regional

National

European

International

In which country(s) are you operating in? (Multiple answers possible)

Ireland.

Austria.

Spain.

Other (please in which other State(s) are you operating in ?)

What is the size of the workforce of your entity? (Single answer possible)

1 to 10

10 to 50

50 to 500



500 to 1000

1000 and more (please state an estimation of the size of your entity)

What main field/s below best describe your job position? (Multiple answers possible)

Research staff

Manufacturing staff

Planning/Design staff

Distribution staff

Non-residential sector focused

Residential sector focused

Installation staff

Non-residential sector focused

Residential sector focused

Maintenance and Operation staff

Non-residential sector focused

Residential sector focused

Energy Company staff

Public Body staff

All the above

Do you take part in other activities? (Multiple answers possible)

Marketing

Meeting new clients

Liaising with suppliers

Financial management

Human Resources/Recruitment

Hardware/Software implementation

Establishing business partnerships

Liaising with sectorial associations

Liaising with local government

Liaising with start-ups/new technology providers in the sector

All the above

Other (please specify) ...

5A. How would you rate the above? (Insert rating matrix for survey and interview)

Activity	Importance			
Marketing	Low	Medium	High	Essential
Meeting new clients	Low	Medium	High	Essential
Liaising with suppliers	Low	Medium	High	Essential
Financial management	Low	Medium	High	Essential
Human Resources/Recruitment	Low	Medium	High	Essential
Hardware/Software implementation	Low	Medium	High	Essential
Establishing business partnerships	Low	Medium	High	Essential
Liaising with sectorial associations	Low	Medium	High	Essential
Liaising with local government	Low	Medium	High	Essential



Liaising with start-ups/new technology providers in the sector	Low	Medium	High	Essential

What is the main mission of your entity? (Multiple answers possible)

Research
 Manufacturing
 Planning/Design
 Distribution
 Non-residential sector focused
 Residential sector focused
 Installation
 Non-residential sector focused
 Residential sector focused
 Maintenance and Operation
 Non-residential sector focused
 Residential sector focused
 Energy Company
 Public Body
 All the above
 Other (please specify) ...

What kind of Heat Pump technology are you installing/manufacturing/developing? (Multiple answers possible)

Air
 Geothermal
 Water
 Hybrid
 Other (please state the type of technology used)

Could you assess the demand level of the Heat Pump market in your geographical operating area? (Open question) In the last three years it has experienced an enormous growth, well above 30%, and prospects are even much higher in the near future

What market changes do you experience or foresee for your area of work? (Open question) Obsolete training system, memory based, inadequate to address increasing and complex demands. Territorial imbalance, most productive firms and installers located in less populated areas. Lack of working capital to allow to organic growth needed to cope with demand.

What competencies would you consider essential in a scenario of raising demand for your services? (Open question) BaU VET schemes are not appropriate, but also dual training is complicated, more practical approaches are required, e.g., by deploying testing facilities and monitors.

Are you currently working with a Heat Pump training institution(s) or trainer(s)? Please could you give us your insights on the impact of your association with this training institution(s) or trainer(s)? (Open question) CNi is currently undertaking short, part-time in-house basic and intermediate training courses, to a limited extent due to conflicts with day-to-day firms workload.

B. Upskilling, training schemes and availability of the work force



Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Even more scarce, new recruitments with low practical backgrounds

Regarding customer orientated competencies? It is more a matter of management rather than technicians

Regarding business competencies? As above

Regarding organisational competencies? As above

Regarding health and safety competencies? Now is acceptable

Could you highlight the main issues regarding the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Public effort in training has declined significantly, and it cannot be compensated by the private sector

Regarding customer orientated competencies? This would not be the problem right now

Regarding business competencies? n.a.

Regarding organisational competencies? n.a.

Regarding health and safety competencies? not a problem for now.

Based on your knowledge, what kind of public education/certification schemes are available in your geographical operating area? Would you consider these certification schemes to be easily accessible? (Open question) Public schemes are lengthy, time-consuming and non-practical, too memory oriented.

C. Policy/legal barriers to training and upskilling

Are there policy/legal barriers to the training and availability of Heat Pump-specialised workforce in your geographical operating area? (Open question) More financial support to practical schemes is needed; the public system is currently too bureaucratic and very little responsive.

Are the policymakers sufficiently supporting current upskilling/training related policies regarding the Heat Pump sector? (Open question) As said above, no, neither for experienced workers nor for newly contracted

Are public subventions easily available to support the training of Heat Pump-specialised workforce? (Open question) Not at all, they are even decreasing

(If the entity is active in several regions/countries) Do you have any challenges with training compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in? What are the main challenges you are facing in that regard? (Open question)

D. Future opportunities: perceived current and future evolutions and recommendation for future evolution



Could you give us your opinion of the current and future evolution of national (and European if the entity is active in several countries/regions) policies related to the training and upskilling of Heat Pump-specialised workforce? (Open question) There not exists as such, only scattered, unspecific measures

Could you highlight the main challenges that national (and European if the entity is active in several countries/regions) policymakers must address regarding the training of the heat-pump specialized workforce and skills/competencies acquisition processes? (Open question). More practical, hands-on courses with specialized staff and appropriate training facilities, especially benchmarks.

Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training? (Open question) A framework action plan is urgently needed, combining training financial support, hands-on training schemes and labour force promotion measures, including aid to incorporate apprentices and external support during the period of practice.

TUS Interview notes:

Name of interviewer: Stephen Murphy, Padraic O'Reilly

Organisation conducting the interview: TUS

Date of the interview: 02/11/2022

Format (online/offline): Online

Did the interviewee provide their job description (Yes/No): Yes

Job title and name of the interviewee: Simon O'Neill Head of Section of Carpentry/Joinery and Plumbing, Engineering School, and Alan Parr Lecturer DKIT

Area of work of the company s/he works for: Education and Training

Location of company: Dundalk

DKIT are recognised by the grant funding body SEAI and their training is sufficient in order to apply for grant funding.

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Preparatory information

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Skills are the specific learned abilities that you need to perform a given job well. Examples, depending on the specific role, range from handling accounts and coding to welding or writing tenders. There is a distinction, however, to be made between hard skills and soft skills. Whereas a hard skill is a technical and quantifiable skill that a professional may demonstrate through their specific qualifications and professional experiences, a soft skill is a non-technical skill that is less rooted in specific vocations. An example of a hard skill, then, may be computer programming or proficiency in a foreign language, whereas a soft skill may be time management or verbal communication.

Competencies are the person's knowledge and behaviours that lead them to be successful in a job. Examples of competencies, then, include the improvement of business processes, strategic planning and data-based decisions. Competencies effectively explain how an individual's behaviours bring about the desired results in their role. As with skills, there are various types of competencies – including core competencies, which are those that any successful employee requires to rise through an organisation.

HAYS Recruiting experts worldwide

WHAT'S THE DIFFERENCE BETWEEN A SKILL AND A COMPETENCY?

Visit our blog to find out more
social.hays.com

SKILLS are the specific learned abilities that you need to perform a given job well, such as:

- 01 0110101 1000101 0101101 11 **CODING**
- HANDLING ACCOUNTS**
- WRITING TENDERS**

COMPETENCIES are the knowledge and behaviours that lead you to be successful in a job, such as:

- PROBLEM SOLVING**
- STRATEGIC PLANNING**
- NEGOTIATION**

The definitions and picture above are taken directly from a recruitment agency (<https://social.hays.com/>), highlighting the fundamental importance of organisations and



sectors to define what skills and competencies they need for a certain position and to design, maintain and run an internal competency framework.

Competency framework definition and purpose

A 'competency framework' is a structure that sets out and defines each individual competency (such as problem-solving or people management) required by individuals working in an organisation or part of that organisation³².

Notes on data gathering purpose

The data gathered as part of this interview will become part of a competency framework designed as part of a project deliverable (Heat Pump Skills and Competency Framework) prepare by the European Heat Pump Association (EHPA)

Why do we ask the interviewee to provide their job description (if available)?

The job description of the interviewee (if available and suitable to be added to the deliverable document) would make it easier to capture the skills and competencies foreseen for the position, as well as other details that might not be mentioned in the interview or given too little attention.

Acronyms and abbreviations

EHPA	European Heat Pump Association
HP	Heat Pump
SME	Small to medium enterprise

Description of Country specific competency environment

In Ireland there are 2 main pathways for hp installations to occur in Ireland, either through the SEAI grant funded scheme or not through the grant scheme. Outside of the grant scheme installers and contractors must follow building regulations which give minimum energy requirements for new builds and deep renovations, however there is no requirement for certification like in the grant process.

³² Chartered Institute of Personnel and Development 2022, 151 The Broadway, London SW19 1JQ, UK Incorporated by Royal Charter, Registered Charity no. 1079797



SEAI Grant Process

The grant process only applies to retrofitted residential housing. In order to apply for a heat pump grant you must first ensure your house is heat pump ready. This is done through what is known as a HLI (heat loss indicator). If the house does not meet the required HLI of below 2.3 then they will not be allowed to apply for grant funding for a heat pump. To install a heat pump in Ireland and receive grant funding from the Sustainable Energy Authority Ireland (SEAI), the personnel nominated to sign off the Declaration of Works must have the following qualifications and training:

Fetac/QQI Level 6 Advanced Craft in Plumbing, including a module on minor electrical works, or equivalent.

Certificate of competence from the specific manufacturer of the heat pumps installed, based on an adequate training programme.

Fetac/QQI Level 6 Heat Pump Systems (Course Code C30263) and supplemental Domestic Heat Pump Installation (Code 700606) or equivalent.

For any electrical works on site a 'Registered Electrical Contractor' (REC) is required to supervise and sign off the electrical installation of a heat pump system, in accordance with the definition of "Controlled Works and Restricted Works" by the CRU. A copy of the REC's certificate must be left with the homeowner and available for inspection. RECs must appoint and keep appointed at all times:

a Principal Duty Holder, and
at least one Qualified Certifier.

A person can be both a Principal Duty Holder and a Qualified Certifier. If a REC fails to maintain the status of his/her named QC, the REC will be removed from the Safe Electric register within 10 weeks. The REC's named QC must submit a copy of his Electrical National Craft Certificate or another suitable award, equivalent to Level 6 or higher on the National Framework of Qualifications and a copy of his personal Electrical Verification & Certification course subject to renewal every five years.

An F-Gas engineer is required to carry out and certify heat pump system installations involving refrigerant pipework and charging as per the F-Gas Regulation.

QQI (Quality and Qualifications Ireland) and FETAC (Further Education and Training Awards Council) are the 2 recognised qualification-awarding bodies.

Interview questions (please note that names, contact information or company will not be shared)



A. Framing the interviewed entity

What level does your company operate on? (Multiple answers possible)

Local

Regional

National

European

International

In which country(s) are you operating in? (Multiple answers possible)

Ireland.

Austria.

Spain.

Other (please in which other State(s) are you operating in ?)

What is the size of the workforce of your entity? (Single answer possible)

1 to 10

10 to 50

50 to 500

500 to 1000

1000 and more (please state an estimation of the size of your entity)

What main field/s below best describe your job position? (Multiple answers possible)

Research staff

Manufacturing staff

Planning/Design staff

Distribution staff

Non-residential sector focused

Residential sector focused

Installation staff

Non-residential sector focused

Residential sector focused

Maintenance and Operation staff

Non-residential sector focused

Residential sector focused

Energy Company staff

Public Body staff

Education Provider

All the above

Do you take part in other activities? (Multiple answers possible)

Education

Marketing

Meeting new clients

Liaising with suppliers

Financial management

Human Resources/Recruitment

Hardware/Software implementation

Establishing business partnerships

Liaising with sectorial associations

Liaising with local government



Liaising with start-ups/new technology providers in the sector

All the above

Other (please specify) ...

5A. How would you rate the above? (Insert rating matrix for survey and interview)

Activity	Importance			
Marketing	Low	Medium	High	Essential
Meeting new clients	Low	Medium	High	Essential
Liaising with suppliers	Low	Medium	High	Essential
Financial management	Low	Medium	High	Essential
Human Resources/Recruitment	Low	Medium	High	Essential
Hardware/Software implementation	Low	Medium	High	Essential
Establishing business partnerships	Low	Medium	High	Essential
Liaising with sectorial associations	Low	Medium	High	Essential
Liaising with local government	Low	Medium	High	Essential
Liaising with start-ups/new technology providers in the sector	Low	Medium	High	Essential

What is the main mission of your entity? (Multiple answers possible)

Education

Research

Manufacturing

Planning/Design

Distribution

Non-residential sector focused

Residential sector focused

Installation

Non-residential sector focused

Residential sector focused

Maintenance and Operation

Non-residential sector focused

Residential sector focused

Energy Company

Public Body

All the above

Other (please specify) ...

What kind of Heat Pump technology are you installing/manufacturing/developing? (Multiple answers possible)

Air

Geothermal

Water

Hybrid

Other (please state the type of technology used) Exhaust Air HP



Could you assess the demand level of the Heat Pump market in your geographical operating area? (Open question) Little demand for training at present however there is a huge demand for heat pumps. This may be due to the new build targets by the government or lack of installers using the grant.

What market changes do you experience or foresee for your area of work? (Open question) – The New Plumbing Apprenticeship curriculum will be more geared towards Heat pumps; this is due to come in in December but more than likely will be next year before it is completed.

What competencies would you consider essential in a scenario of raising demand for your services? (Open question) -In the context of DKITs training, the participants (mainly plumbers) get a Broader understanding of other skills and crafts (electrical, F-gas) and building infrastructure (insulation, airtightness). They also get an understanding that Heat pumps are a more precise piece of equipment than the traditional boiler, which tended to be oversized by choice.

B. Upskilling, training schemes and availability of the work force

Could you evaluate the quality and availability of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? More aware after attending the course

Regarding customer orientated competencies? More aware after attending the course

Regarding business competencies? More aware after attending the course

Regarding organisational competencies? More aware after attending the course

Regarding health and safety competencies? More aware after attending the course

Could you highlight the main issues regarding the training, competencies and skills of Heat Pump-specialized workforce in your geographical operating area? (Open question)

Regarding technical skills? Minimum Entry standards need to be maintained, only people that have experience with heating systems can apply for the course, as a minimum requirement of knowledge is required.

Regarding customer orientated competencies? Minimum Entry standards need to be maintained, only people that have experience with heating systems can apply for the course, as a minimum requirement of knowledge is required.

Regarding business competencies? Minimum Entry standards need to be maintained, only people that have experience with heating systems can apply for the course, as a minimum requirement of knowledge is required.

Regarding organisational competencies? Minimum Entry standards need to be maintained, only people that have experience with heating systems can apply for the course, as a minimum requirement of knowledge is required.

Regarding health and safety competencies? Minimum Entry standards need to be maintained, only people that have experience with heating systems can apply for the course, as a minimum requirement of knowledge is required.



Based on your knowledge, what kind of public education/certification schemes are available in your geographical operating area? Would you consider these certification schemes to be easily accessible? (Open question)

METAC, DKIT, WWETB, Ballyfermot ETB, ATU

C. Policy/legal barriers to training and upskilling

Are there policy/legal barriers to the training and availability of Heat Pump-specialised workforce in your geographical operating area? (Open question)

No (but perceived barriers by installers are minimum requirement within grant scheme and Grant scheme bureaucracy)

Are the policymakers sufficiently supporting current upskilling/training related policies regarding the Heat Pump sector? (Open question)

Could do more

Are public subventions easily available to support the training of Heat Pump-specialised workforce? (Open question)

GreenTech Skillnet and ETBs are providing funding for training (up to 30%). Could do with more consistency as there are different funding mechanisms available in different regions.

(If the entity is active in several regions/countries) Do you have any challenges with training compatibilities of Heat Pump-specialised workforce in the different geographical areas your organisation is operating in? What are the main challenges you are facing in that regard? (Open question)

There are Difference between the currently 3 DIFFERENT COURSES, not all equal in scope or content but are serving same clientele and the same requirement for grant funding.

D. Future opportunities: perceived current and future evolutions and recommendation for future evolution

Could you give us your opinion of the current and future evolution of national (and European if the entity is active in several countries/regions) policies related to the training and upskilling of Heat Pump-specialised workforce? (Open question)

Better national coordination, from apprenticeship to post-apprenticeship

Could you highlight the main challenges that national (and European if the entity is active in several countries/regions) policymakers must address regarding the training of the heat-pump specialized workforce and skills/competencies acquisition processes? (Open question) Same as Previous

Could you share any recommendations for future policy changes regarding Heat Pump-specialised workforce training? (Open question)

5-year re-assessment (similar to gas industry), changes in industry.

Need to have a register, and to continue to be registered, you must re-assess every 5 years. As per Climate Action Plan