H2020-LC-SC3-EE-2019

HEAT PUMPS SKILLS FOR NZEB CONSTRUCTION (HP4ALL)

D6.3 – REPORT ON THE ACTIONS FOR THE TRANSFER OF THE HP4ALL APPROACH

Lead Partner: FCTA- Fundación Corporación Tecnológica de Andalucía

Author: Carlos García

Date: 3 April 2023

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775. 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.

Project details			
Project acronym	HP4ALL	Start / Duration	September 1, 2020,
Topic	LC-SC3-EE-3-2019-2020 Stimulating demand for sustainable energy skills in the construction sector	Call identifier	H2020-LC-SC3-EE-2019
Type of action	Coordination and support action (CSA)	Coordinator	Technology University of Shannon (TUS)
Contact persons	Padraic O'Reilly (**padraic.oreilly@tus.ie**); Stephen Murphy (**Stephen.Murphy@tus.ie**)		
Website	**http://www.hp4all.eu**		

Report Contributors				
	Name	Organisation	Role / Title	**E-mail**
Report leader	Carlos García	FCTA	Head of Sector Building and construction	carlos.garcia @corporaciontecnologica.com
Contributing Author(s)				
Reviewer(s)	Padraic O'Reilly	TUS	Research fellow	padraic.oreilly@tus.ie
	Stephen Murphy	TUS	Research fellow	stephen.Murphy@tus.ie
Final review and quality approval	Stephen Murphy	TUS	Research fellow	stephen.Murphy@tus.ie

Document History			
Date	Version	Name	Changes
10/03/2023	0.1	Carlos García	First Draft
13/03/2023	0.2	Stephen Murphy	First Review
30/03/2023	0.3	ESV	Update to Annex
31/03/2023	0.4	Carlos García	Executive Summary and Updates
03/04/2023	1.0	Stephen Murphy	Final Review

Horizon 2020 European Union Funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

Table of contents

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

Executive summary

In the context of current EU energy policy and labour market related initiatives (REPoweEU, Fit for 55, Pact for Skills, Skills Partnerships etc.) in response to emerging geopolitical, social, economic and environmental threats the HP4All project aims to enable a massive capacity and skills development within the key, strategic, Heat Pump (HP) sector following a holistic, approach involving both the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.).

To this end HP4ALL has developed a set of tools and resources to be adapted and replicated EU-wide -the so called **HP4ALL package**-:

-A **HP Competency Framework** to facilitate Mutual Recognition of HP Skills

-A user-oriented **HP Knowledge Hub** (e.g., technical information, case studies, procurement guidance etc.) to help out stakeholders' decision making throughout the whole value chain, in particular in its lower end (designers, installers, consumers)

-An **HP Benchmarking Tool** to optimize the HP acquisition decision making process

- **Awareness Campaign materials** to assist in the EU-wide roll out of heat pumps and the replication of the HP4ALL project success.

With a view to ensuring its widest adoption at EU scale the HP4All package has been validated, in three countries/regions with varying stakeholders and scenarios: **Upper Austria, Andalusia, and Ireland**.

Further to it, a set of EU outreach and transfer actions of the HP4ALL package for different audiences (HP4ALL Replication Plan and Roadmap**,** Deliverables 6.1 and 6.2). has been rolled out. This Report summarizes its outcome and **conclusions**, which are the following ones:

- HP4ALL policy & legislation measures were overall considered pertinent and timely.
- More fora should be made aware of HP4ALL findings and conclusions, particularly the Committee of the Regions and DG EMPL.
- An integrated approach at national and regional level throughout the whole value chain is needed. HP Associations play a central role on it.
- Amongst the proposed measures the following ones were considered essential: awareness campaigns to address visibility and cultural barriers; labour conditions assurance; workforce gaps quantification; education and training reinforcement including soft skills (cross skilling); new job niches promotion (advice and project management); streamlined VET certification and mutual recognition; HP installation and aftersales quality assurance; enhanced, market facilitating, public procurement; intensified budget allocation within ESIFs, notably ESF+.

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

Acronyms and abbreviations

EC	European Commission
EE	Energy Efficiency
EHI	European Heating Industry
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
ESIF	European Structural and Investment Funds
ESF	European Social Fund
EU	European Union
HP	Heat Pump
MEPS	Minimum Energy Performance Standards
MFF	Multiannual Financial Framework
MS	Member States
OSS	One-Stop-Shop
RED	Renewable Energy Directive
RES	Renewable Energies
RPEU	REPowerEU Initiative
RW	Renovation Wave
WP	Work Package

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

1 The HP4ALL project, an enabler for HP skills enhancement

HP4ALL aims to facilitate an increased market demand (procurement and contracting services), a large-scale rollout and a further advancement and uptake of heat pumps (HPs) technologies and systems for residential and non- residential applications, **with the subsequent market boosting of related skilled workforce demand and provision** by:

- Providing HP related tailored, sound, key information to all relevant stakeholders and users, thereby facilitating their decision-making process.

- Paving the way for a more robust level of skills in the HP value chain, ensuring high quality and reliability from the supply side

To this end HP4ALL has developed a set of tools and resources -the so called **HP4ALL package**-:

- An **HP Competency Framework** to facilitate Mutual Recognition of HP Skills. It will allow manufacturers, designers, and installers to benchmark their knowledge and skills to determine if they are meeting the needs of the market. Such a framework will also facilitate mutual recognition across the EU.

- A user-oriented **HP Knowledge Hub** to provide guidance, support, and tools (e.g., technical information, case studies, procurement guidance) to increase the demand for HP skills and knowledge.

- An **HP Benchmarking Tool** enabling end users to consider options and performance of HP technologies within different building and application types.

- A dossier of tested **Awareness Campaign materials** to assist in the EU-wide roll out of heat pumps and the replication of the HP4ALL project success.

This group of mutually reinforcing measures encompass proposals for legislative and administrative adjustments to foster skills offerings and demand for those skills, labour market consolidation schemes (e.g., updated competency frameworks and requirements for skilled workers in procurement and dedicated training schemes for installation & maintenance professionals), incentives (based on success stories), and ambitious private and publicly supported dissemination & communication packages targeting end users and market demand via behavioural patterns changes and engagement, amongst others.

The HP4ALL consortium has been interacting with the **entire HP value chain**, both the supply side (manufacturers, engineers, designers, installers) and the demand one (building owners and end users form all sectors -residential, industry and tertiary). With a view to ensuring its widest adoption at EU scale the HP4All package has been disseminated, tested, validated, and fine-tuned by means of **three implementation plans** with different and complementary approaches in three partner regions with varying stakeholders and scenarios, these regions

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

include **Upper Austria, Andalusia, and Ireland**. The ultimate goal is that the HP4ALL package be tailored to different market conditions throughout the EU, raising awareness of and assuring commitment to the abovementioned objectives.

In parallel to the above, a coherent set of framework supportive **Legislation & Policy Recommendations** has been drawn up.

The impact of HP4ALL will be maximized through the involvement of the **Observer Countries** (HR, PT, RO), following closely the development and validation of the HP4All package, and acting as early adopters thereof even before the project ends. The implementation plans have been informed by **extensive stakeholder engagement** to spot and map current and future barriers to HP market exploitation and skills development.

Leading experts in the HP and Energy sector have provided feedback for and participated in the preparation and deployment of these implementation plans through a set of consultations, workshops, and events.

HP4ALL long-term EU-wide outreach will be guaranteed by a dedicated **Replication Plan**, and its corresponding promotion and awareness raising campaign **Roadmap**, which is the subject of the present document.

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

2 HP4ALL Roadmap implementation outcome & findings

2.1 Introduction

The HP4ALL Replication Plan Roadmap aimed to set up both a consistent portfolio of D&C measures (information, education, motivation) to *raise awareness* of the HP4ALL package potential and *capacity building* actions to conduct its recommended implementation pathways and tools[1]. The end result being engagement and recruitment of range of stakeholders along the whole HP value chain to carry on the deployment and adoption of the HP4ALL project.

It is based on the experience gained during the project implementation, particularly WP5 (Boosting HP demand in 3 pilot regions) as a set of case studies, success stories and a proven methodologies used throughout that can be replicated in further regions. As provided for in the Grant Agreement, the two main events that constitute the core of the HP4ALL Replication Plan Roadmap are as follows:

- A *train-the-trainers workshop* targeting cluster managers, energy agencies and other relevant actors. It will be promoted across all EU clusters from the construction and energy sector (including those that are part of the pool of Observers).

- A *policy makers workshop*, wherein the handbook for policy and legislation recommendations developed in WP5 and the competency frameworks developed in WP3 will be presented.

In addition to these events, some *other dedicated events* have been conducted and planned for after the lifetime of the project alongside a *digital marketing campaign* that will disseminate and communicate these further events.

2.2 Policy Makers online Workshop (16th February 2023)

Background

This invitation-only event aimed at selected European (CINEA, DG Energy, others), national and regional level policy makers and interested parties (e.g., EHPA National Associations Representatives). The main talking points of this workshop were the *HP4ALL project Policy & Legislation Recommendations Paper* and the related *EHPA Policy Paper* and proposed *HP Accelerator*, aimed all at providing a practical and feasible package of policy measures at all levels to increase HP skills and the demand thereof EU-wide. Feedback from the workshop will be incorporated into these documents.

[1] described in the Replication Plan (Deliverable 6.1), as well as in the Policy recommendations guidelines (Deliverable 5.4)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

Approach

Experts panel (Delphi Panel) made up of up to 10 selected representatives from regional, national and EU administrations in charge of energy, building and employment policies including HP4ALL Observer Countries, as well as other interested parties (e.g., National / Regional HP Associations) and the HP4ALL consortium members.

Experts received in advance all relevant documents, whose *core contents* were revised during the workshop in order to reinforce, fine-tune or add up to them.

An agile and straightforward panel and discussion were conducted to swiftly get to relevant conclusions. Contents will be analysed by blocks -on average, 10/15´per block, up to 6-9 blocks in total to be discussed- (e.g. certification schemes, MRAs. public procurement, financial measures etc.) and addressed consecutively and in turn by all experts in order to systematise and speed up the process.

Outcome and conclusions

Overall perception

All the proposed 11 policy & legislation measures were considered pertinent and timely, in particular DG ENER highlighted the following ones:

- Awareness campaigns
- Labour conditions improvement
- EU legal reinforcement of curricula requirements
- EU level reinforcement of E&T schemes content requirements
- Streamlined VET certification and Mutual Recognition schemes.
- Reinforced school energy skills curricula

Experts underlined the importance of getting the Committee of the Regions (CoR) and DG EMPL aware of the HP4ALL recommendations package and they also suggested involving HP4ALL partnerships as speakers / invitees in other relevant (e.g., Pact for Skills meetings, Clean Energy Industrial Forum, LIFE CET funded BUILDUP Skills national roadmaps).

Specific comments:

1. *Awareness campaigns*: Action is needed at all levels, but the core message should be similar and consistent everywhere, with just formal adaptions to regional / local contexts and channels.

2. *Labour conditions*: The intensified, accelerated HP staff recruitment process that is needed in the present context should always be tackled whilst respecting and improving workers labour conditions. Urgency should not be invoked as an excuse or a justification to deny, delay or bypass the establishment and consolidation of adequate and acceptable working conditions for new workers, e.g., immigrant staff, young apprentices or women should

Horizon 2020 European Union Funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

enjoy acceptable, non-discriminatory labour conditions and career prospects (i.e. labour conditions dumping would not be acceptable)

3. It is also important to quantify workforce gaps, particularly installers.[2]

4. *Energy rehabilitation training & skills curricula:* Apart from traditional, more technical, job profiles, more attention should be paid to emerging job niches such as "renewable energy fitters" which could clearly make up for existing basic information and initial assistance gaps. These advisory, more orientation and assistance targeted profiles would provide another pathway for people to enter the labour market and enable upskilling for chief installers and designers.

5. *Training schemes minimum content requirements:* Whilst aiming at more consistent, complete, mutually reinforcing, and far-reaching training schemes (including common modules), trainers and trainees burnout risks must not be neglected; in this sense, shorter duration, part-time more intensive blended schemes should be looked at instead of more extensive ones. More clear consideration of specific training profiles (e.g., electricians, plumbers, both for reskilling and upskilling[3]) for complementary, lifelong learning schemes are also needed.

6. *VET certification and mutual recognition schemes*: For the sake of efficiency and labour market responsiveness, account should be taken of the changing roles and responsibilities that public administrations, certification bodies and other competent entities are actually facing, in order to give more momentum to more agile and collaborative semi-formal or non-formal public-private approaches[4].

   Nevertheless, it is important to note that even in the best scenario it is a time-consuming process, and that a stepwise approach would work better in the end, starting up with "renewable energy fitters" certification and recognition patterns, and then moving onto more complex profiles (i.e. advanced installers and maintenance workers).

7. *School curricula*: No further comments received.

[2] Build Up Skills is doing this currently, see here for Ireland https://www.igbc.ie/busi2030

[3] As an example, Quality Qualifications Ireland (QQI) accredited training introduces electrical concepts to the HP installer, but any electrical work **must** be carried out by a RECI approved electrician. So the heat pump installer needs to be able to guide the electrician who will carry out the work. This role is generally played by the manufacturer's representative until such time that an installer has built up enough experience to give this guidance themselves. **See Annex to this Report for more information.**

[4] In this sense, it is crucial that internal training delivered by the manufacturers obtain the required certifications (electricity, F gases). **See Annex to this Report for more information,**

Horizon 2020 European Union Funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

8. *Quality assurance mechanisms:* An extended total quality management and full traceability approach throughout the whole value chain is urgently needed to allow for manufacturers and end-users reassurance and market boosting and development.

9. *Public procurement:* The leverage and launching customer effect of public procurement, particularly at local and regional level, has been so far unexploited. Public buyers are increasingly aware of the chances for optimal quality/cost ratio offered by the EU Regulation, especially for more energy efficient devices and systems (e.g. embodied carbon targets, life cycle analysis).

10. *Energy rehabilitation advice and project management support:* Apart from the abovementioned emerging profiles (energy fitters, multiskilled installers) there is also room for improvement in project management and assistance for deep retrofit and renovation. One-Stop-Shops, Clearinghouses, Call Centres should include training and signposting to this kind of professionals, thereby giving them visibility and recognition.

11. *Visibility and prioritization within ESIFs, particularly ESF+:* No further comments received.

12. *Coordination mechanisms:* No further comments received.

2.3 HP4ALL train-the-trainers event (27th February 2023)

Background

This online workshop aimed at providing EU-wide (including Observer Regions) knowledge transfer to HP value chain industrial clusters (manufacturers, designers, constructors, installers), energy agencies and other relevant stakeholders (e.g., third level institutions: universities, institutes of technology, and colleges of education; public and private foundations; NGOs etc.) enabled to carry on with the replication of the HP4LL approach and package (information, awareness raising, education and training).

It also provided feedback to inform about and fine tune the Replication Plan and Roadmap (Deliverables 6.1 and 6.2)

The event outlined the HP4ALL package, the methods, the approaches, and the implementation of the three HP4ALL pilot regions. The event also showcased lessons learnt and provided orientation on the steps and recommendations to promote the adoption (i.e., its marketing-mix and policy support) of the HP4ALL package.

The workshop was promoted across all EU clusters from the construction and energy sector, including those that are part of the pool of Observer Countries. Collaboration will be sought with relevant EU stakeholders (e.g., the European Cluster Collaboration Platform (ECCP); EHPA Associates).

Horizon 2020 European Union Funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

Nearly 20 experts and representatives from the HP value chain skills & training domain from Ireland, Portugal, Spain, Croatia, and Austria teamed up to discuss the findings, lessons learnt and next steps to make to roll out the HP4ALL package (Competency Framework, Knowledge Hub, SW Benchmarking tool, Awareness Raising Materials) EU wide, on account on the lessons learnt in the pilots carried out in Ireland, Spain (Andalusia) and Upper Austria.

Approach

Hands-on presentation of the HP4ALL package and its replication plan followed by a round table with attendees.

Outcome and conclusions:

Main conclusions of the workshop were:

- HP Associations will be key to go on with the follow-up HP4ALL package replication. If possible, this should be an occasion to aim at a more integrated approach at national / regional level taking onboard the whole HP value chain (manufacturers, designers, installers, end users), HP4ALL project will be available on the short to medium term to provide feedback thereon.

- Regardless of the convenience of a Competency Framework, it is crucial to forge it into tangible reference assets such as *skills cards* or *microcredits / micro credentials.*

- Installers are at the core of the process; further development of the HP4ALL package must address specific tools to help support installation, *handover assurance* and *aftersales customer comfort service protocols*, in close collaboration with manufacturers.

- *Non-formal supply driven training certification schemes* will have a key role in many cases depending on the responsiveness and readiness of the administration; this is to be considered when drawing up regionally adapted HP enhancement packages.

2.4 Other dedicated events

Mutual Recognition Agreements: Public webinars and meetings with European Heat Pump Associations

The HP4All task related to Mutual Recognition Agreements, has been expanded upon by EHPA, with the design and implementation of data gathering and input providing tool, in the form of two webinars on the subject, as well as two workshops with National Heat Pump Associations. Additionally, further dissemination and signatures on the topic, will be pursued as part of the project final conference.

The first public event was held under the umbrella of the EHPA annual forum and titled “Ambition requires action: Mutual recognition agreements and the upskilling transformation”. This event gathered 31 participants (recording here) and was centred on the REPowerEU, EHPA Heat Pump Accelerator and sectorial growth.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 891775.

The second public event was held under the umbrella of the European Year of Skills and titled "Heat Pump skills and competencies: Preparing for mass deployment". This event gathered 91 participants (recording here) and was centred on the EU wide policies in the training sector, the growth of the sector from a Polish and Norwegian perspective as well as other project examples.

Two closed door meetings were held as part of EHPA's National Heat Pump Association committee. Feedback on the agreements lead to a decision of an in-depth involvement of Associations in further work in the field as well as any other relevant project calls on the subject. One meeting was held on the 25th of November 2022 and the 2nd one on the 30th of January 2023. These concluded in the signing of the first Heat Pump Skills Recognition Agreements.

Main conclusions and recommendations of these events to ensure HP related skills mass deployment EU wide, mostly in line with the ones stemming from the two abovementioned workshops, were:

Policy recommendations:

- Launching an ambitious *EU campaign* to raise attractiveness and change mindsets on technical education and technical careers (manufacturing, installing, maintenance) versus more commercial approaches.

- Gathering Member States, social partners, academia and all relevant EU and national stakeholders under a "*Skills4Climate/Climate crafters Platform*"

- Require Member States to periodically *assess the gap between available and needed installation professionals* to achieve EU climate and energy objectives via the up-skilling and re-skilling are not enough, it must be accompanied by *short term targets and key indicators setting, enabling and capacity building action plans* and *contingency plans* to curb them.

- Design and deploy in a coordinated and synergistic way at all levels (EU, state, region) *integrated incentive packages and frameworks*, particularly through the support of ESIFs and NGEU funds[5] as well as of Erasmus+, Horizon Europe and the European Institute for Technology programmes amongst others:

    - Incentives for Technical Education

    - Incentives for Apprenticeships

    - More Public-Private Partnerships

Technical recommendations:

[5] Notably the European Social Fund Plus -ESF+-

Horizon 2020 European Union Funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

- *Up-skilling* and *reskilling* will be viable as long as cultural barriers[6] be tackled.
- *Cross-skilling* (system integration, soft skills etc.) is essential for customer comfort and assurance.
- *Design simplicity and modularity* is key in installations (improved productivity & faster deployment)
- *Interoperability*: providing agnostic trainings
- *Coupled labour market and product market development*: Supply shortages affect both and simultaneously to labour force and products, both must be synchronised.

2.5 Digital marketing

The third phase of the Dissemination and Communication Plan consists of supporting the replication and exploitation actions of HP4All. With the project coming to an end, it will be essential to link the exploitation and dissemination activities to guarantee the future replication of results. The final event will be celebrated openly in this period and all the knowledge and materials gathered in the project life will be made available online.

HP4All partners are committed to continue disseminating the project results and goals at least two years after the project ends, so a wider impact can be reached. Thus, the website and corporate channels will continue to be the main repository of documentation and the access to the key innovations developed. As stated on the Grant Agreement Article 29 “Unless it goes against their legitimate interests, each beneficiary must — as soon as possible — ‘disseminate’ its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium).”

In compliance with this article, our partners have actively contributed to disseminating the HP4All project from the very beginning by different means: social media posts, attendance at conferences and shows, emailing campaigns, newsletters, press releases, etc. and will continue after the lifetime of the project.

[6] i.e., not presenting them as a sub-employment option but as a promising and stable career, clarifying training requirements and benefits thereof, devising attracting relocation packages and providing it with social recognition.

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 891775.

Annex: HP upskilling & reskilling issues

This Annex intends to shed some further light on the *potential*, the *conditions* and the *time* needed for *upskilling*[7] and *re-skilling* workers from other sectors (not necessarily plumbers, electricians, or gas boiler installers), and to check for possible shortcuts for workers coming from other sectors more easily adaptable to the HP sector.

a. Ireland

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.
Heat Pump Installers are more often plumbers (trade) with some training on heat pumps from the manufacturer at a minimum and have further modules on heat pumps completed (up to 20 ECTS credits) at a maximum , electrical connections made by an electrician who is registered under RECI, and F-Gas handled by Refrigeration who is a registered F-gas technician. 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 the air from brine ground loops.

Based on the Irish market, there are plenty of opportunities in Ireland to re-skill or up-skill. There are courses that are HP orientated and require an advanced craft certificate upon entry (Mechanical, Plumbing, Electrical, etc), however the vast majority of HP installers in Ireland will be plumbers. To become a plumber (HP installer) it is needed to complete a plumbing apprenticeship which is usually 4 years, but due to the backlog caused by Covid-19 could take up to 7 years. The apprenticeships work on a first come first serve basis for 'off the job training' and there are 3 phases that require this 'off the job training' as shown below. It is also worth mentioning that the current apprenticeship does not include heat pumps as a primary module, only as a secondary optional module. There is scope for further investigation into updating the apprenticeship to include renewables and reflect the market.

Phase		Minimum Duration/Weeks	Location
1	**On-the-Job**	12	Employer
2	**Off-the-Job**	20	Education and Training Board
3	**On-the-Job**	26	Employer
4	**Off-the-Job**	10/11	Institute of Technology / Technological University
5	**On-the-Job**	26	Employer
6	**Off-the-Job**	10/11	Institute of Technology / Technological University
7	**On-the-Job**	12	Employer

[7] E.g. within SMEs which have the three main profiles in-house (F-gas, electricity, plumbing), also allowing for the installation of combined PV+HPs systems.

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

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	- 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	- 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,

Horizon 2020 European Union Funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

When it comes to HP and PV integration, 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 solar PV installations. The Solar PV company will then be able to integrate control of both the HP and the PV.

b. Spain (Andalusia)

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 wise the 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. 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.

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 last one officially registered installer / designer in the firm, but as such there is not an integrated, publicly accessible registry of individual officially authorised individuals . You can browse the registry through different criteria, particularly the type of installations they are entitled to carry out.

As a result of the construction long lasting crisis in the last decade the sector GDP contribution in Andalusia dropped from 15% to barely 5%, with an enormous amount of skilled and unskilled workers made redundant.

To tackle the issue the Regional Government of Andalusia put in place the Sustainable Construction Enhancement Plan back in 2015, with dedicated and prioritised measures to boost building energy rehabilitation measures, including the setting up of an installers and suppliers integrated catalogue and labour market enhancement measures. This programme received the REGIOSTARS Award in 2015.

Together with the above an Andalusian Sustainable Construction Cluster was also established in 2015, which has focused its efforts on education & training measures although addressing digital transformation and, only recently, energy transition targets.

Unemployed workforce from the construction sector has thus been given the main and primary attention in the context of energy transition. In this sense, the perception of Spanish HP

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.

Installers Associations is that HP related installation electromechanical work could be addressed by these profiles with adequate upskilling packages.

Nevertheless manufacturing industry views differ to some extent from the above because, even recognizing this jobs pool, expresses some doubts on the adequacy of it to meet more specific manufacturing and assembling skills which are not exactly those required for installers (e.g. more knowledge base in basic equipment design, fabrication and operation, manufacturing process control, quality assurance, environmental performance etc.).

In the short-term internal staff reskilling to acquire more competencies is viewed as the surest option by installers, especially micro SMEs, which clearly talk about “multiskilled” workers -able amongst others to tackle the installation of combined HP-PV systems-, but in the long run it will not be enough. In the case of HP manufacturers this is clearly insufficient in view of the huge increase in sales they are facing.

Aged workers coming from related, declining sectors (e.g. metallurgy, thermal plants) seem not being totally adapting to this change, with increased training and reskilling difficulties, whilst younger ones are more attracted by other sectors (aerospace, automotive, RES manufacturing and production, especially wind, biomass, PVs or solar thermal). In this sense *bundling* and *coupling* HP installation skills with other RES related ones together with appropriate *branding* may work as long as it is socially and economically recognized: it is more enticing offering “RES installation” profiles than solely electrician or plumbing ones.

In conclusion, although decoupling HP work profiles would lead to more specialised professionals, workforce shortage is so huge that in the medium term only reskilling and skills integration will allow for the challenge.

c. Upper Austria

Heat pump designer and installer: 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). The structure of the training programme is defined and managed by the Austrian installers' trade association. 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.

Ground source heat pumps designer and installer: In addition to above, there are voluntary and certified training programmes that cover ground source heat pumps in more detail.

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.

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). Throughout their career, installers have access to a range of

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 891775.

further education courses offered through the Austrian installers' trade association and its partner organisations.

Heat pump manufacturers in Austria offer training programmes for installers on HP installation, commissioning, and customer service with a focus on the company's products. These are very important to ensure that their products are well understood and correctly installed on the market. In addition, in-house specialists support installers in planning, commissioning and maintenance.

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 and competency fields required along the heat pump value chain. The AIT is well recognised in Austria as a provider of technical training for HP installers/planners, for example their 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). The ESV's Energy Academy also offers a variety of training seminars, site-visits, workshops and more on topics relating to energy efficiency and renewable energy, including specialised training courses on HP technologies. The activities target a wide range of stakeholders along the HP value chain (i.e. persons responsible for energy matters in companies, municipalities and organisations, planners, building services specialists, installers, property developers, energy advisors, energy auditors, producers of building energy performance certificates, architects, providers of energy and building-related products & services, banks). Such trainings help ensure that knowledge and competencies are of high-quality and up to date with market and technology developments.

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891775.