HEAT PUMPS SKILLS FOR NZEB CONSTRUCTION (HP4ALL)

Pilot Region Regional Development Plans

Lead Contractor: OÖ Energiesparverband (ESV)

Author(s): OÖ Energiesparverband

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This report presents the regional development plans developed for each of the pilot regions.

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1 Introduction

The overarching objective of the HP4ALL project is to enhance, develop and promote the skills required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings. The project 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. Following a comprehensive, systemic point of view, both the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.) are engaged.

A core element of the project is the application of a range of measures in 3 pilot regions: Ireland, Upper Austria, and Andalusia/Spain, that aim to address different HP market sectors, applications, and technology solutions. A range of measures will be applied in Upper Austria, Ireland, and Andalusia/Spain. Each pilot region will take specific approaches to the roll out of targeted activities and materials, and the development and promotion of HP Skills depending on different market scenarios in each country.

The following document presents the individual and tailored action plans developed for each of the pilot regions. The action plans give a brief background of the heat pump market and define the pilots in terms of their scope and key objectives, the target groups and stakeholders that will be engaged, the planned activities and tools to be used, their communication strategy, and the foreseen timetable.

These plans set the foundation for the implementation of actions and activities in the pilot regions. However, owing to the dynamic nature of market development efforts and results, the plans will be further developed or modified as needed to achieve maximal impact in the pilot regions.

2 Pilot Region of Ireland

Background / starting point

Ireland is an island nation with a temperate climate with a major climatic influence coming from the Atlantic Ocean. Ireland has a population of 4.995 million (Eurostat, 2020) with 5 cities Cork, Dublin, Galway, Waterford, and Limerick. The Irish housing stock consists of 1,775,475 residential and partly residential buildings, enumerated in the 2016 Census. Just 33,436 householders indicated their dwelling was built between 2011 and 2016, an average of just 6,687 per year. In contrast, 431,763 households stated that their dwelling was built between 2001 and 2010, an average of 43,176 per year (CSO,2016). In the Climate Action Plan 2019, the Irish government listed action 60 which will effectively ban the installation of oil boilers from 2022 and the installation of gas boilers from 2025 in all new dwellings through the introduction of new regulatory NZEB standards for home heating systems and increase the cumulative number of buildings that are retrofitted to a B2 equivalent BER to circa 500,000 by 2030. To reach a BER rating of B2 renewable energy heating sources are required, with the Irish

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government aiming for ‘reaching circa 600,000 renewable energy heating sources (e.g., heat pumps) in residential buildings by 2030, and circa 25,000 in commercial premise’. To undertake this huge challenge. The Irish government along with key stakeholders in the heating industry have developed a roadmap to support the phase out of fossil fuel boilers (Action 66), which will introduce ‘national standards for design and installation of heat pumps’ (Q1 2021) and ‘coordinate the roll out of a training programme to up skill approximately 300-500 heat pump installers’ (Q4 2023).

Currently, heat pump installers in Ireland do not have to register with an industry body in the same way as gas (RGI) and oil boiler (OFTEC) installers do. Training courses are available for installers as an add-on module to existing apprenticeship level qualifications such as plumbing or allied trades.

In the mid to late 2000’s, Sustainable Energy Ireland ran a grant scheme for domestic heat pumps and an associated training course was developed by a collaboration of SEAI, Arsenal Research and training providers in Ireland and Northern Ireland. The end of the grant scheme and the drop in heat pump installations caused by the global financial crash of 2008 led to a fall in demand and eventual closing of these training courses around 2012. A new heat pump grant in 2018 required an updated training course. Content was developed by a collaboration of SEAI, training providers, the Irish Heat Pump Association and other industry parties. It up to individual training providers to achieve their own FE certification for this training module.

Course details:
FETAC/QQI code: 6N5646
Level: 6
Credit Value: 10

The purpose of this award is to equip the learner with the knowledge, skill, and competence to design, install and commission domestic heat pump systems in a safe and competent manner and in accordance with appropriate legislation, regulations, and standards. The course is typically delivered over 30 hours of class contact with a further 30 hours of additional work. Demand for the course is mainly driven by companies with a desire to participate in the SEAI Heat Pump grant scheme.”

In the spring of 2021, a standard for Heat pump installations was published by the National Standards Association of Ireland (NSAI) in conjunction with Sustainable Energy Authority Ireland (SEAI) and the Heat Pump Association of Ireland (HPAI). The SR50-4 standard gives guidelines for the design, installation, commissioning, and maintenance of heat pump systems with an effective rated output up to 70 kW in new and existing dwellings. Prior to this standard, there were no standard practices for installing heat pumps, meaning there were no standardised target efficiencies for installations to adhere to.

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Scope and key objectives

The Irish pilot will primarily focus on the heat pumps installed in new-build residential houses with a secondary focus on non-residential heat pump projects.

The design and installation of residential heat pumps that are not in receipt of grant funding is not specifically overseen or certified. It should be covered as part of building regulations control but evidence from our work on HP4ALL to date shows that the standards of design, installation and hand-over vary across the market. In the context of a huge, planned increase in the numbers of installations, this situation has the potential for large numbers of under-performing installations.

HP4ALL will actively engage with all actors in the supply chain and with end users to develop an understanding of the key weaknesses in project delivery mechanisms and putting together education and training materials aiming to impact on 10 specifiers and 150 installers of domestic scale heat pumps. It is envisaged that these efforts will impact on approximately 3,000 heat pumps and their end-users.

The national Climate Action Plan published in 2019 contains action 66 which is focused on the development of skills relating to residential heat pumps;

Action 66: Roadmap to develop supply chain to support the phase out of fossil fuel boilers in new dwellings			
Steps Necessary for Delivery	**Timeline by Quarter**	**Lead**	**Other Key Stakeholders**
Introduce NZEB Dwellings in Building Regulations to facilitate phasing out the installation of oil boilers in new dwellings where practical	Q2 2019	DHPLG	
Develop National Standards for the design and installation of Heat Pumps in New Dwellings	Q1 2021	NSAI	DBEI, DCCAE, SEAI, DHPLG
Coordinate the Development of Training specification for the design and installation of heat pumps	Q4 2021	DCCAE	DES, SOLAS, ETBs, SEAI, DHPLG
Put in place a registration scheme for competent heat pump installers	Q4 2021	DCCAE	SEAI
Complete 2023 Cost Optimal study to identify cost optimal performance for NZEB Dwellings to take account of developments in supply chain	Q1 2023	DHPLG	SEAI
Coordinate the roll out of a training programme to up skill approximately 300-500 heat pump installers	Q4 2023	DCCAE	DES, SOLAS, ETBs, DHPLG
Subject to completion of the above actions and results of 2023 cost optimal study, advance the building regulations requirements for new dwellings to a performance requirement based on the use of heat pumps	Q4 2025	DHPLG	

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The first two items in the table above have been completed. HP4ALL aims to engage with policy makers at national level to integrate our pilot work with developments in the third item, the coordination and development of training specification for the design and installation of heat pumps. TUS are ideally placed to make a significant contribution to this work as researchers in the field of heat pumps, with the support of our academic colleagues in the field of building services engineering and with our contacts on the ground within the heat pump industry.

The deployment of non-domestic heat pumps faces significant challenges, particularly in public buildings. Heat pumps are supplied with comprehensive control systems that are capable of managing a wide range of equipment within the setting of small to medium non-domestic buildings. These control systems are often under-utilised or worse, over-ridden by inappropriate or incorrect integration with Building Management Systems or hydraulic arrangements that may also involve fossil fuel boilers. The task of the consulting engineer is further complicated when projects require public procurement as the design documentation cannot specify any particular manufacturer.

As independent brokers, HP4ALL can engage with the suppliers of large heat pumps through our contact with the Heat Pump Association of Ireland. We plan to meet with these companies to learn about issues they have encountered due to the structures they often encounter during large building projects where they have to interact with architects, consulting engineers and Mechanical and Electrical installation contractors. We would then engage with a number of specifiers, consulting engineers and installation companies to learn more about their perspective on the matter with the aim of highlighting the strengths and weaknesses of the current approach in relation to its effect on operating efficiency and the level of understanding of these systems enjoyed by their end-users. This work will aim to impact on 15 installation companies and 5 individuals involved in the design and specification of non-residential heat pumps.

Target groups and stakeholders

Target group / stakeholder	Why they are important	How they will be engaged
Housing Authorities	To better understand the development process and tendering process for procuring HPs, help build up knowledge and competencies.	Interviews and webinars
Department of the Environment, Climate and Communications	Help to gain a better understanding of the roadmap set out in action 66 of the climate action plan and how HP4ALL can support these activities	Interviews & collaboration events
Training Providers	We want to improve the teaching and learning experience, the uptake of training, and increase the provision of training	Interviews and webinars

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Consulting Engineers	To help get a better understanding of the design, procurement and commissioning processes	Interviews
Local County Councils	To build knowledge and engage in producing a national handover guide for county councils and homeowners	Interviews, Webinars, and events
Developers	To better understand the development process and tendering process for procuring HPs, help build up knowledge and competencies.	Interviews and webinars
Homeowners	Heat pump day to day users with little understanding of the units	Guides, knowledge hub and hand over events.
Social Housing	Heat pump day to day users with little understanding of the units	Guides, knowledge hub and hand over events.
Heat Pump Association of Ireland	Have extensive knowledge in the field of HPs and also have a website with a lot of resources	Interviews
Sustainable Energy Authority Ireland	The main grant scheme for HPs in Ireland is through SEAI	Interviews
HP manufacturers	To gain a better understanding of the supply side and also market ability to commit.	Interviews

Activities and tools

Events:

- Host short training webinars for developers and try to get their HP installers involved in the webinars. Formats can be CPD or Lunch time webinars.
- Interviews with consulting engineer firms
- Interviews with large and small heat pump installation companies
- Interviews with policy makers
- Meetings with education & training developers and providers
- Meetings and interviews with equipment suppliers (Domestic / Non-Domestic) and HP association
- Host Handover Guide events in Estates between the installers and the end users.

Materials:

- knowledge hub,
- benchmarking tool,
- Power point presentations, Webinars, and events
- Guide/factsheet for installers
- End User handover guide – Help County Councils to develop their guides. Conversations have begun with Galway and Clare Co Councils.
- Need to be aware of the covid situation on how training is delivered.

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Other activities:

- BUILD UP Skills Webinars – attendance and participation in break-out sessions
- SEAI Energy show
- Contribute to DASBE project
- Participation with SEAI and NSAI on the promotion of the new national standard

Communication strategy and channels

- HP4ALL website and project communication and dissemination channels
- TUS Development unit website and social media channels
- Targeted mailing and phone calls to consulting engineers, local authorities, developers, policy makers, Heat Pump Association of Ireland, and direct contact with equipment suppliers
- Contact with ambassadors who TUS already work with in the fields of energy efficiency, skills for construction and sustainability.
- We will contact end users via the developers, local authorities or professionals involved in delivering their projects

Timetable

2022: Q1 – Q4 Production of training materials

- Define our first impression of the training materials that might be needed by our different target audiences. Use the surveys conducted in WP2, 3 & 4 as well as interviews carried out in Autumn/Winter 2021 to select initial headings and learning outcomes.
- Produce a first version of these materials and begin using them in February.
- Refine the materials as interviews and events progress

2022: Q1 Engage & Interview

- Engagement to Developers, Local Authorities, and installers for set up of webinars
- Engagement with education and training providers for set up of webinars
- Engagement with Local Authorities about End User Handover guide
- Engagement with Policy makers
- Interview Developers, Local Authorities, and installers
- Set out plan with Local Authorities about End User Handover guide

2022: Q2 Webinars and Collaboration

- Collaborate with Developers and set up training for installers and feedback
- Collaborate with Training providers to survey trainees, and training being developed.
- Pilot End User Handover Guide & survey end users moving into homes with HP.

2022: Q3 & Q4 Events

- Meetings with End Users. For residential projects involving multiple dwellings in the same development, we would organise virtual or face-to-face meetings with the residents, heat pump installers, representatives of heat pump suppliers and the project developers to provide information and promote discussion among the stakeholders.

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- For non-residential end-users, on a project-by-project basis, we would organise similar meetings with all stakeholders while also seeking to invite consulting engineers who were and were not part of the project so as to provide information and training to these professionals.

2022: Q1 - Q4 Evaluation and reporting

- Researching national and EU approaches to measuring impact on the basis of these contacts and ensuring that all our materials are of the required standard to count as being impactful.
- Keeping track of all the stakeholders we engage with and learning about how many installations they are working on and as many details of these installations as possible (i.e., heat pump type, make, capacity and details of the connected heating system and the BER of the building). Providing them with new knowledge should assist them in improving the average efficiency of all the systems they work on. This is how we calculate the impacts of our pilot activities.

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3 Pilot Region of Upper Austria

Background / starting point

Austria:
The HP market in Austria started taking off in the 1980s and has experienced steep growth since the turn of the century – in parallel with the introduction of energy-efficient buildings with low heat demand. Today, there are over 350,000 HPs in operation. Almost 32,000 new systems were installed in 2020, a growth of 8% compared to 2019. Of these systems, 78% are used for space heating, 21% for hot water, 1% for room ventilation and less than 1% in industry. The strongest growth is seen for HPs for space heating up to 10 kW – which currently account for about 40% of new systems installed each year. Overall, the HP sector in Austria (including production, trade, installation, and monetary value of heat) represents a market of 870 million Euro/year, provides over 1,700 full-time jobs and exports more than 15,000 HPs annually (Source: Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, Report "Innovative Energietechnologien in Österreich Marktentwicklung 2020").

Upper Austria:
Upper Austria is the most industrial of Austria's 9 regions and is responsible for 25% of the country's exports. It covers an area of ca. 12,000 km^2 and is home to 1.5 million inhabitants. Since the mid-90s, the regional government, supported by the regional energy agency OÖ Energiesparverband (ESV), has been following a strategic and long-term vision in the face of the changing global energy world. Well-established policy structures to tackle the energy transition are already in place. The region's multi-faceted approach is based on a combination of regulatory measures ("sticks"), financial incentives ("carrots") and information and training activities ("tambourines").

In Austria, due to the country's federal structure, building legislation and the implementation of the European Buildings Directive are regional matters. This offers the regions flexibility in choosing which measures to apply to achieve energy and climate targets. In Upper Austria, legislation for buildings and heating and cooling systems are strategically used to drive innovation by regularly updating them towards higher efficiency and lower emissions. Funding programmes that target the various steps of the innovation process are also strong tools. Different programmes support R&D, market introduction of new technologies and their subsequent mass deployment.

Today, as a result of these measures, already 71% of the electricity, 60% of all space heating and 31% of the primary energy in the region come from renewables. Through significant increases in energy efficiency and renewable energy, greenhouse gas emissions from buildings have been reduced by 39 % in the last 15 years.

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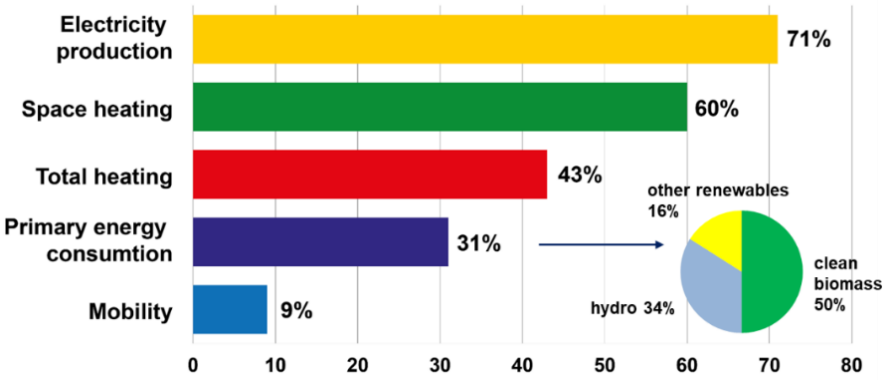
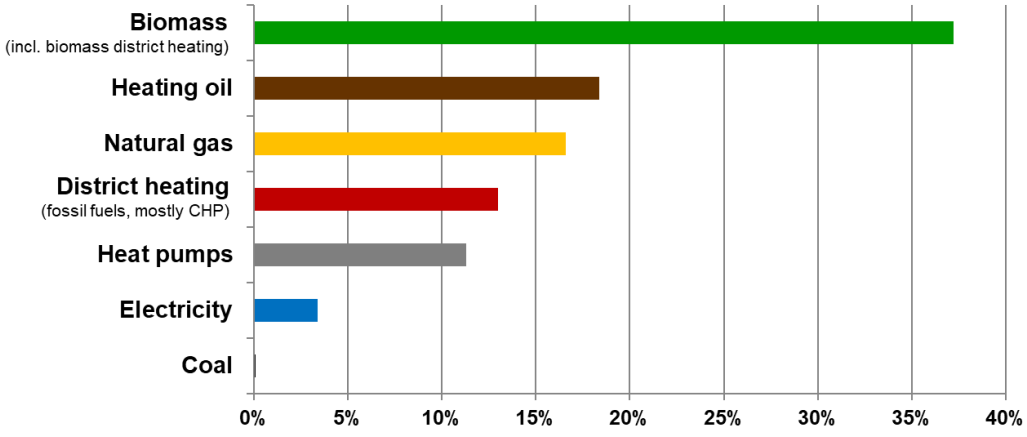


Renewable shares in sectors in Upper Austria
Source: OÖ Energiesparverband

The heat pump market for small, residential applications is already quite well developed (especially in new builds). Around 11% of Upper Austrian dwellings are equipped with heat pumps, and the trend is increasing. New HP trends that have emerged in recent years include combined systems (heating and cooling) and hybrid systems (biomass and heat pump systems).



Heating % of all dwellings in Upper Austria
Source: OÖ Energiesparverband

Scope and key objectives

The Upper Austrian pilot will primarily, but not exclusively, focus on developing the market for mid-/large-scale HP applications (commercial and industrial) in the region. This market is still at a relatively early stage in Upper Austria and faced with the related challenges. These include especially low levels of awareness of promising application possibilities among planners and users, and the lack of required skills by planners and installers. There are currently very limited information activities on larger-scale HPs.

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The main objectives of the pilot activities include:

- boost demand for mid-/large-scale HPs for companies
- awareness raising of promising and economically feasible application possibilities (among planners and users) and related skills
- increased information activities and training on larger-scale HPs

The overall scope of the pilot is to provide options for phasing out fossil-fuels in companies through the up-take of other renewable energies, such as HPs. Since Upper Austria has a long tradition in biomass technologies, project activities will target both solutions.

Additionally, some activities will focus at supporting HP innovations and the upskilling and demand for skills in the residential sector. For this, the OÖ Energiesparverband will make use of its experience and portfolio of information and awareness raising activities.

The pilot's focus and activities are developed to make best use of current "opportunities" in the region. The government's current 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.

Several funding programmes are currently available for the residential and non-residential sector. This is quite helpful for market development. Strict efficiency criteria in funding programmes assure that only high-quality technologies are installed and that the further development of the HP sector contribute to energy efficiency and renewable goals. Efficiency criteria include:

- performance requirements, based on a seasonal efficiency calculation
- strict noise limits for air-source HPs
- refrigerant Global Warming Potential (GWP) must be below 1,500; maximum flow temperature of the heat distribution system: 40°C
- must be combined with 3 kW PV, 4 m² solar thermal or green electricity contract.

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.

Companies have been showing increased interest in the energy transition and in using sustainable/renewable energy supply in recent years – partly driven by the government's decarbonisation target. Also, the possibility of using HPs for cooling and for using waste heat are important positive aspects for many companies. Among others, the pilot activities aim at showing where and how this can be done and at increasing the uptake of HP technologies for these purposes.

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Target groups and stakeholders

The Upper Austrian pilot activities will reach out to the following key target groups and stakeholders along the HP value chain.

Target group / stakeholder	Why they are important	How they will be engaged
Companies	They are potential users of mid-/large-scale HPs. Finding forerunners and guiding them through their HP projects is key to getting the market going.	• awareness raising activities, training seminars and information events • energy advice and guidance in designing and implementing their HP projects. • information materials • existing installations used as best practice case studies
Planners, installers	Qualified professionals are crucial for achieving high-quality HP installations. Since the market for mid-/larger-scale HPs is still at an early stage, it is pivotal to increase knowledge and skills of these systems among planners and installers. Also, up-skilling professionals on small-scale systems is still important due to innovations in technologies.	• targeted training seminars • technical trainings for certified HP planners and installers • information materials
Energy advisors	Energy advisors are key actors in driving the energy transition in Upper Austria. They have direct contact with end-users and are a trusted source of information on technologies and energy efficiency solutions. Companies have access to subsidised energy advice services for decision making on energy projects. Homeowners have access to free energy advice services for their new build or renovation project. Energy advisors need to be well-informed about HP technologies and applications so that they can communicate this information to the end-users.	• targeted training seminars and continued education • information materials

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HP end-users for residential buildings	Residential HPs for space heating make up a large percentage of HP systems in Upper Austria. Increased knowledge and interest in HPs could help increase the number of systems even more.	• awareness raising activities and information events (ex: building and renovation tradeshows). • information materials • HP4ALL benchmarking tool

Activities and tools

Events:
Events will be organised with the aim of training around 200 people along the HP value chain. In addition to adding HP content to its current information services, the ESV will develop new events (i.e., in its Energy Academy), cooperate with organisations in the HP sector, and take advantage of possible synergies with already existing events.

The planned event include:

What	For whom	When
Multi-day training course to become a certified HP planner and installer (together with AIT and Wärmepumpe Austria)	planners, installers, providers of building technology, property developers	one course in Nov.-Dec. 2020 one course in Nov.-Dec. 2021
Information event on larger-scale HPs: planning a session in the context of a conference organised by Wärmepumpe Austria for the DACH region (Germany/Austria/Switzerland)	manufacturers, planners, public bodies	16 September 2021
Training course on climate-friendly heating systems for residential buildings, with a focus on HPs	planers, installers, property developers, providers of building technology, architects, energy advisers	11 November 2021
Multi-day training of energy advisers (including a heat pump training session)	person interested in becoming energy advisers	Nov.-Dec. 2021
Participation in tradeshows: dissemination of material and information	mainly for residential end-users and building owners	5-7 Nov. 2021 4-6 March 2022
Training course on renewable process heat for industry	energy managers in companies, facility managers, energy auditors, planers, installers, suppliers of energy products and services for industry	23 March 2022

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Training course on HPs for professionals in the construction sector	planers, installers, property developers, providers of building technology, architects, energy advisers	19 April 2022

Materials and tools:
A range of resources will be developed, made available and disseminated to support the objectives of the pilot.

What	For whom
Knowledge Hub: compilation of links to relevant existing information materials and tools, on HP4ALL and ESV website. Some of the included resources include: – AdieuÖl campaign and related resources (Upper Austrian campaign on eliminating oil heating and switching to renewable heat) – Information guides on HPs, energy labelling of heating systems, NZEB new builds and refurbishment, building performance certificate, etc. – Information on subsidies available in Upper Austria – Best practice examples in companies, municipalities, and residential buildings	primarily targeted towards building-owners and end-users in the residential and non-residential sectors, planners, and installers
Renewable process heat guide: guide with information on HP, bioenergy and energy efficiency technologies, areas of application, tips for planning, implementation and operation, checklist, case studies, subsidies	building owners and potential buyers and users of mid-/large-scale HP systems, mostly in companies and industry, planners, installers
Case studies: approx. 10 best practice case studies (partly included in the HP guide)	primarily targeted towards and end-users in the residential and non-residential sectors, planners, and installers
Benchmarking tool: tool to calculate the "in-situ annual performance factor" for domestic units. Results as a scale green to red.	end-users of residential HPs
Residential HPs Guide: reviewing and updating the ESV's current guide on residential HPs	end-users of residential HPs

Communication strategy and channels

As regional energy agency, the ESV has a very good understanding of the energy and business landscape in Upper Austria and is well placed to work across the value chain (from manufacturers to end-users). It has an extensive database of companies and their CEOs and facility managers. In addition to its wide portfolio of services to private households and actors in the residential sector, the ESV also has existing services for companies. These services can be strategically used to support the objectives of the HP4ALL pilot.

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In addition to being a trusted source of information on energy efficiency and the energy transition, the ESV manages funding programmes for the regional government. It has extensive experience in market transformation and with information campaigns, training, and in offering energy advice and facilitation services.

The main communication channels used in the context of the pilot activities are:

Which channel	How will it be used
ESV's own website	dissemination of the guide, information materials and benchmarking tool, promotion of events
HP4ALL website	knowledge hub, promotion of events
ESV newsletter	dissemination of the guide, promotion of events, of ESV advice services and of available subsidies
targeted mailing to ESV's extensive database	reaching specific target groups with relevant information
ESV's existing services for companies: • energy advice services for companies • competence centre for funding programmes and information hub on ESV's website • Energy Academy	reaching building owners and potential buyers and users of mid-/large-scale HP systems, mostly in companies and industry, promotion and carrying out of trainings, dissemination of the guide, information materials and information on subsidies
communication through the business network Cleantech-Cluster (250+ energy and environment companies): website, newsletter	reaching companies in the energy and environment sector, promotion of trainings, dissemination of the guide, information materials and information on subsidies
tradeshows	dissemination of the guide, advice service, information on subsidies

Timetable

Year	Activity (in chronological order)	Approx. timeline
2020		
	Multi-day training course to become a certified HP planner and installer (together with AIT and Wärmepumpe Austria)	Nov.-Dec.
2021		
	Development of the benchmarking tool and embedding in the ESV's website	Summer-fall

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	Development of the "Renewable process heat guide" and the case studies	Summer onwards
	First version of the Knowledge Hub available on the HP4ALL website	Fall
	Information event on larger-scale HPs: planning a session in the context of a conference organised by Wärmepumpe Austria for the DACH region (Germany/Austria/Switzerland)	September
	Home build tradeshow in Ried, Upper Austria	November
	Reviewing and updating the ESV's current guide on residential HPs	November
	Training course on climate-friendly heating systems for residential buildings, with a focus on HPs	November
	Multi-day training course to become a certified HP planner and installer (together with AIT and Wärmepumpe Austria)	Nov.-Dec.
	Multi-day training of energy advisers (including a heat pump training session)	Nov.-Dec.
2022		
	Training course on renewable process heat for industry	March
	Training course on HPs for professionals in the construction sector	April
	Construction and building tradeshow in Wels, Upper Austria	March
	Finalising the "Renewable process heat guide" and the case studies	Spring
	Review and update the Knowledge Hub (final version)	December

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4 Pilot Region of Andalusia/Spain

Background / starting point

General information:

a) **Area & population**: Spain is a sovereign transcontinental country and a member of the European Union. Its territory, with a total surface area of 505,944 km^2 and 47,450,795 population, is divided into seventeen autonomous communities, made up of fifty provinces, and two autonomous cities (Ceuta and Melilla). Spain is located both in the south of Western Europe and in North Africa, occupying most of the Iberian Peninsula in Europe.

b) **Weather**: Spain has a very diverse climate throughout its territory. The Mediterranean character predominates in almost all its geography: mild temperatures and abundant rainfall almost all year round except in summer. As one moves towards the centre and north of the country, the climate becomes more extreme: low temperatures in winter, high temperatures in summer and irregular rainfall (depending on geographical position). In general, the western communities receive more precipitation than the eastern ones. The north has an oceanic climate, characterised by abundant rainfall throughout the year, especially in winter, and cool temperatures.

c) **State of building stock**: according to the Recovery, Transformation and Resilience Plan published by June 2021, in Spain, around 45% of the buildings are pre-1980, a percentage that rises to 50% in the case of residential buildings, and a figure of 9.7 million houses. At the same time, it is estimated that around 1 million houses are in a poor, bad, or dilapidated state.

   Likewise, if the quality of existing buildings is analysed based on energy ratings, more than 81.0% of existing buildings are classified as E, F or G, in terms of emissions, with this percentage increasing to 84.5% of buildings in the case of energy consumption, which shows the significant potential for the energy refurbishment needed in Spain.

Spanish HP Market context:

According to the HP Eurobarometer (EurObservER, 2018) the Spanish HP Market is the third largest in Europe. In 2015, more than 35% of Spanish households and facilities were equipped with HPs with an average COP of 3.5. 95% of the HPs were used to provide both heating and cooling with the remaining 5% providing cooling only. Nearly 90% of units installed were in domestic settings whilst industry and commerce are lagging.

The Spanish climatization market experienced a turning point between 2014 and 2017, with 71% reported cumulative increase in HPs installed, and an 85% increase in RES share (Spanish Association of HP Manufacturers -AFEC Online Yearly Report 2019). From 2017 onwards the climatization market levelled off overall and the HP market continued to grow.

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The year 2020 experienced a sharp reduction in HP installations (-19.5%) due largely to the COVID-19 outbreak. Installations decreased by a relatively modest 13% in the domestic sector, but the impact has been more severe in the industrial sector, which saw a 27% decline, and the commercial sector, which saw a 29% drop in installations. (AFEC Online Yearly report 2019).

According to the Spanish Institute for Energy Savings and Diversification (Spanish HP Market Report 2018), there is a clear untapped potential for HP usage in providing sanitary hot water applications and the use of geothermal RES to supply both residential and tertiary applications. Currently, the projected HP market share by 2030 ranges from 10% to 70% depending on the type and region of application. However, the political HP deployment targets for 2030 (reflected in the Spanish Strategy for Energy Efficiency in Buildings) are currently under revision and are likely to be more ambitious in the context of the renewed EU Commitments relating to climate change and the energy transition.

Scope and key objectives

The main goal of the Spanish pilot is twofold:

- To untap the potential of the public sector as an outstanding driving demand force as a public promoter and as a key market influencer through legislative, administrative, and financial initiatives.
- To increase HP manufacturers competitiveness through a robust public sector influenced (launching customer) demand

The target sectors are HP manufacturers, installers & public sector.

The scale of implementation is public buildings (residential and non-residential) at local, regional & national level.

Challenges addressed and for which target groups:

- Facilitate the uptake of advance heat pump technologies by public authorities or public building owners as launching customers.
- Encourage product development by manufacturer clusters aligned with public bodies.
- Make more transparent the advantages and opportunities of heat pump technologies to public promoters, public authorities, installers, and citizens

Current "opportunities" to make use of:
The mobilisation of *Next generation EU funds* particularly through the *Renovation Wave* Initiative and related national schemes, particularly the *Housing Rehabilitation and Urban Regeneration Plan* with an associated budget of 6.280 M€, which also address the increase in the housing stock for social rent in energy-efficient buildings, contributing to the activation of this sector and the generation of employment and activity in the short term.

As a specific objective, The Plan seeks to achieve energy rehabilitation rates significantly higher than the current ones that will allow to advance the fulfilment of the rehabilitation objectives contemplated in the Spanish Integrated National Energy and Climate Plan (PNIEC)

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and in the Long-term Strategy for Energy Rehabilitation in the building sector in Spain (ERESEE).

These measures have an enormous potential in Spain due to the age and overall state of the public and private building stock, as well as for their capacity to decarbonize the economy, innovation in financial instruments and job creation, social cohesion, and urban and rural impact.

More specifically, relevant measures featured in the Plan include:

- *Rehabilitation Offices* ("one-stop shop") through the establishment of a regulatory framework to facilitate the management of aid, financing, and taxation, accompanying throughout the rehabilitation process.

- Improvement of the financing of rehabilitation actions through a *regulatory reform* and application of *specific financial instruments* to improve the financing of rehabilitation interventions, especially in neighbourhoods.

- *Strategic Rehabilitation Programmes* for economic and social recovery in residential environments that will consist of large-scale rehabilitation, regeneration, and urban renewal operations, in neighbourhoods or areas delimited according to their income level and that will have a special impact on vulnerable groups, included in the National Strategy against Energy Poverty.

- *Programme for the construction of social rental housing in energy-efficient buildings* that aims to support the development of a set of measures developed by the different public administrations to substantially increase the supply of housing for rent at an affordable price, with the collaboration of the private sector.

- The *Energy Rehabilitation Programme for buildings* (PREE), which promotes the energy rehabilitation of existing residential buildings and other uses, through energy saving and efficiency actions and the incorporation of renewable energies.

- *Regeneration and Demographic Challenge Programme*, aimed at public and private projects in municipalities and nuclei of less than 5,000 inhabitants to promote and deploy energy efficiency measures and technology investments in buildings and households, self-generation and consumption of renewable energies and deployment of electric mobility.

- *Programme for the Rehabilitation of Public Buildings (PIREP)*, which pursues the sustainable rehabilitation of the institutional public owned / rented building stock at state, regional and local level, with a clear exemplary and signposting vocation and the integrated character demanded by the Spanish Urban Agenda and the new European Bauhaus (sustainability, inclusion, and aesthetics), without losing sight of the main objective of energy saving.

- Programme for the design and implementation of *local action plans pilot projects* within the frame of the Spanish Urban Agenda to promote the approval of local action plans that, in addition to allowing the effective implementation of the Spanish Urban Agenda, exemplify,

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as pilot projects, the methodology, the process followed and the result to guide other local entities to make their own

In addition, it is also noteworthy refer to the enforcement of both the new *Building Technical Code* and the *Technical Regulation for Thermal Installations*.

Target groups and stakeholders

The target groups and stakeholders for the Spanish pilot will be mainly public bodies and professional associations (researchers, manufacturers, designers, promoters, constructors, installers) whom CTA is in contact because of its recurrent activities as cluster, interface organisation, private funding body and RTDI promoter and performer.

Target group / stakeholder	Why they are important	How they will be engaged
Regional / local public housing promoters owning /renting social housing residential buildings	The Andalusian Housing and Rehabilitation Agency is the biggest public promoter in Spain (more than 86.000 households) and a key prescriber; its initiatives trigger off very important effects into the supply chain. Likewise, public province and local housing agencies and firms in the 8 provinces of Andalusia play a key role at such level	The HP4ALL package will be presented at dedicated workshops/meetings. Feedback will be sought for: - Knowledge hub - Training materials - Benchmarking tool
Regional/local public entities owning / renting non-residential buildings	Energy efficiency measures adopted by these bodies have got a strong replication and prescription potential	
Policy makers (State & Regional Ministries and Local Departments)	Policy makers set the financial, administrative, and legal context, provide relevant information, and have decision making power	The HP4ALL package will be presented at dedicated workshops/meetings. Feedback will be sought for: - Knowledge hub - Training materials - Competence framework

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Professional Associations and key representative entities thereof: - Promoters - Constructors - Researchers - Manufacturers - Installers/technicians	Value chain segment prescribing and leveraging aggregated effect	The HP4ALL package will be presented at dedicated workshops/meetings. Feedback will be sought for: - Knowledge hub - Training materials - Benchmarking tool - Competence framework

Activities and tools

The main activities will be:

- *2 webinars* about project results and presentation of the HP4ALL package, one targeting policy makers and another one targeting the private sector. Date and content to be defined.

- *1 regional event* targeting all the stakeholders to present project aim, scope and expected results and create awareness about the resources provided in the hub. This event took place on the 10th of November 2021 in Granada within the frame of the 1 Congress on Innovation and Sustainability in Social Housing ISVIS 2021 organised by the Andalusian Housing and Rehabilitation Agency.

- *1 regional event* focused on the proposed competence framework targeting policy makers, professional associations, VET schools' representatives to discuss the results from the public policies assessment and present the recommendations (incl. a World café approach for triggering discussion between policy makers and education sector). Date and content to be defined.

- *1 regional event* for private sector capacity building to provide feedback on the knowledge hub content and awareness campaign materials where universities and research centres can present the last trends. Date and content to be defined.

- *6 bilateral* meetings with key professional associations between M17-M30 to get feedback on the knowledge hub, benchmarking tool and awareness campaign materials.

Communication strategy and channels

The communication and dissemination activities will be made mainly through:

- HP4ALL's official website and social medias.

- CTA's official website and social medias.

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- Targeted mailings: CTA's network and newsletter (reaching more than 2000 registrants).
- Press work: related articles published by CTA on social medias and press release prepared by HP4ALL communication leader.
- Ambassadors.
- Dedicated events (see above)

Timetable

Year	Activity (in chronological order)	Approx. timeline
2021		
	1 regional event targeting all the stakeholders in order to present project results and create awareness about the resources provided in the hub	November - December
2022		
	1 webinar about project results, one targeting policy makers and another one targeting private sector	April-August
	1 webinar about project results, one targeting policy makers and another one targeting private sector	September. - December
	1 regional event targeting policy makers, professional associations, VET schools representatives in order to discuss the results from the public policies assessments and represent the recommendations	September - November
	1 regional event for private sector capacity building where universities and research centres can present the last trends	September - November

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