H2020-LC-SC3-EE-2019_ HEAT PUMPS SKILLS FOR NZEB CONSTRUCTION (HP4ALL)

D2.4 – Policy and legislation review

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Acronyms and abbreviations

HP	Heat Pump
EC	European Commission
GP	General Public
OEM	Original Equipment Manufacturer
PM	Policy Makers
SC	Scientific Community
CTA	Technological Corporation of Andalusia
IERC	International Energy Research Centre
EHPA	European Heat Pump Association
EU	European Union
DB-HE	Technical Building Code and Energy Certification of Buildings
RITE	Building Thermal Facilities Regulation
BER	Building Energy Rating
ETS	Emission Trading Scheme

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Executive summary

Background

HP4ALL aims to facilitate the large-scale rollout of heat pumps (HPs) in residential and non- residential buildings by working with the entire HP value chain including both the supply side (manufacturers, engineers, designers, installers) and the demand side (building owners and end users).

To facilitate the appropriate development of tools and resources for key market actors in the HP value chain, the current state of incentives and practices in public and private procurement (with an emphasis on green public procurement) was assessed. For this purpose, the HP4All team conducted a literature review on policies and legislation, and a review of current incentives, gathering information about best-practices and success cases relevant to the topic of skills in the HP Market in each of the consortium regions (Ireland, Spain, Upper Austria, and Italy), also at Europe wide and international level.

Aside from this bibliographic research, 5 online and face-to-face interviews were conducted with policy makers and public procurement related organizations to capture information about their expectations and foreseen actions. This feedback will be considered when designing the set of recommendations for policies and legislation in WP5.

In total, 15 policies (2 in Spain, 2 in Ireland, 2 in Italy, 3 in Upper Austria, 3 across Europe, and 3 at international level (Canada, USA and China)), 4 legislations (2 at Europe wide and 2 at international level (USA and Japan)).

In addition, 17 current incentives were reviewed (1 in Spain, 3 in Ireland, 1 in Italy, 3 in Austria, 3 across Europe, and 5 at international level (2 in Canada, 2 in Australia and 1 in USA). 60% of these aim to increase the number of installed HPs and the remaining 40% focus on HP technology training or awareness.

Finally, 6 interviews were held with policy makers, 1 by IERC (Ireland), 1 by EHPA (Belgium), 1 from RINA (Italy) and 3 by CTA (Spain).

Main conclusions

This document presents a successfully tested portfolio of policy, legislation, financial tools, and experience driven lessons. All of them offer broad cross-fertilization potential. Beyond the consortium countries, relevant examples have been found within the EU and abroad (Australia, Canada, China, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, United Kingdom, United States).

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The consortium countries (Spain, Ireland, Italy, and Upper Austria) feature an initial good set of policy mechanisms in place to address the energy transition and encourage the deployment of heat pumps in residential and non-residential buildings. In particular, the initiatives in Upper Austria and Ireland deserve further attention due to their very specific focus on HP and their interesting potential for replication and adaptation in other countries. Nevertheless, findings of this report indicate that there is still clear room for improvement and development in the heat pumps market for residential and non-residential applications.

Pilot Regional Development Plans which will run during the life of the HP4ALL project will include not only references to and reliance on existing local tools and frameworks but also suggestions for newly devised / locally adapted instruments identified elsewhere, either within the EU or abroad.

Despite country specificities in the policy, legal and market framework, common challenges and approaches have been identified, amongst which:

- Long-term government ambition for and commitment on renewable heat and energy efficiency in buildings through adequate planning, legal, technical, and administrative regulations with specific provisions / mandates for heat pump installation

- Holistic approach integrating renewable heat with energy efficiency policies and facilitating action at the local level.

- Addressing economic barriers and market failures via heat pump specific taxation, financial instruments, and support mechanisms to overcome high upfront acquisition and installation costs, particularly for vulnerable groups.

- Addressing non-economic barriers through building codes and installer certifications

- Information provision, awareness raising, and value chain networking are pending issues. A coordinated effort for the publication and circulation of technical manuals and guidance and the implementation of far-reaching information campaigns (Germany and Sweden provide success stories in this respect) is urgently needed.

- Innovation: Most governments with strong heat pump markets have long supported dedicated research and innovation programmes, particularly for combined and hybrid solutions. This has been pinpointed as a clear key success factor.

- Education & training: Despite its strategic importance only a few countries have got specific, long-lasting, support mechanisms. Reinforced education and training throughout the whole value chain, particularly for designers and installers is yet a bottleneck.

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- Green and innovative procurement is an underexploited tool that public authorities could efficiently use to leverage public investment and trigger off market deployment, particularly in the case of provision of combined or hybrid solutions.

As reflected above, the optimal combination seems to include demand stimulation through government specific, intensive fiscal and financial incentives, increased and sustained investment in training, up-skilling throughout the value chain, added legal and technical pressure to replace fossil fuel electricity for heat generation with renewables.

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1 Introduction

1.1 Background

HP4ALL aims to facilitate the large-scale rollout of heat pumps (HPs) in residential and non- residential buildings by working with the entire HP value chain including the supply side (manufacturers, engineers, designers, installers) and the demand side (building owners and end users). The project is focussing on holistically and systemically reducing the energy performance gap in Nearly Zero Energy Buildings (NZEBs) through increasing the level of skills in the HP value chain.

HP4ALL is developing a set of tools and resources for use by the different stakeholders which will be tested and validated in different markets through regional implementation in Austria, Spain, and Ireland. The intention is that these resources, which will be tailored to the needs of each market, will drive market change, influence end-user decisions, and accelerate uptake of innovations and emerging technologies in the HP market.

This document presents the work of one action carried out at WP2 – "HP Value Chains – Barriers and skills analysis". WP2 assembles the core knowledge base and resources to inform all other WPs in their development stages.

The main objectives of this work package have been delivered in four steps:

- **Step 1**: Revise the current best practice initiatives for increasing skills in the energy sector: an assessment was made of the state of the art (SoA) of measures at EU, national and regional level that are stimulating the demand for sustainable energy skills and relevant to the heating and cooling market.
- **Step 2**: Identification of a panel of heat pump experts: a panel of experts from the EU and the regions was identified and registered to assist the project in finding solutions to address market inertia.
- **Step 3**: Evaluation of the status of the market for HP skills in Europe: market research was carried out through expert surveys to understand the status of the HP market and to understand the point of view of those currently working within it.
- **Step 4**: Review revisions to the policy and legislation around Europe that are driving HP roll out. Specific policy initiatives and barriers that can influence the market and skills development were studied and recommendations in this area were developed for policy makers.

This document is the outcome of the fourth step, where the HP4ALL consortium has focused on developing recommendations for future policy and legislative actions in the regions and across Europe.

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This objective has been achieved by engaging with the main actors in the HPs supply/value chain at an EU and National/Regional level (Spain, Ireland, Italy, and Upper Austria) to ascertain their expectations, needs and identify relevant opportunities.

1.2 Objectives of the study

The objective of this study is to:

- Identify key policy and legislation instruments underpinning or hampering the use and deployment of HPs in the consortium regions (Ireland, Spain, Italy, Upper Austria), EU and worldwide.

- Highlight successful incentive schemes with high leverage potential.

When combined with the “Report on best practices initiatives designed to increase skills in the sector” (D2.1) and the "Report on findings from HP expert surveys & focus groups “(D2.3) and "Public and market acceptance report” (D4.1) also written by the HP4All project team, this package of documents will provide a comprehensive assessment of the policies and legislations, and the supply and demand considerations for HP skills in the pilot regions and beyond.

1.3 Methodology

The general methodology for carrying out the research work followed a five-step process:

1. **Bibliographic research and information gathering,** choosing the most appropriate methodology for each regional market (online surveys, public sources, and repositories, etc.).

2. **Regional sub-reports drafting** by local partners.

3. **Carry out interview with regional policy makers** on the HP support related framework, key enabling factors, overlaps, gaps, and potential barriers.

4. **Sub-reports collation, integration, and consolidation** to capture overall key ideas and main insights.

5. **Develop and agree document structure** as follows:

    a) Executive summary and introduction (sections 1-3)

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b) Review of relevant legislation overview (section 4). The review includes both EU and international level legislation as the former sets the boundary conditions for downstream national implementation where normally only bespoke operational technical adaptations for the local context are implemented.
c) Review of relevant policies (section 5) and incentives (section 6) that support the large-scale adoption of HPs in the HP4ALL consortium countries (Ireland, Upper Austria, Italy, and Spain). This is deemed crucial for the success of the upcoming design and implementation of the Pilot Regional Development Plans. The review will also focus on EU and worldwide HP scenarios to seek further inputs.
d) Analysis of the interviews with policy makers (section 7)
e) Conclusions (section 8)

The consortium has developed and agreed on this structure and contents (Annexes 1-4: Templates for Policies, Legislation, Incentives, Policymakers interviews), which are also included in the corresponding Annexes (5-6 Legislation, 7-12 Policy, 13-18 Incentives)

Throughout this exercise, each region took different, region appropriate approaches in the process of getting the information, contacting policy makers, and conducting the survey reflecting the individual requirements of each region.

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2 Legislative Review

The legislative review focused on legal corpus relevant to the HP market deployment and related skills demand promotion. Annexes 5 and 6 illustrate in more detail the more directly (potentially or actually) applicable policy and legislation.

The current EU policy and legislative agenda is driven by the comprehensive integrated climate and energy policy adopted by the European Council on 24 October 2014 and revised in December 2018, which sets out to achieve the following targets by 2030:

- A reduction of at least 40% in GHG emissions compared to 1990 levels.
- An increase to 32% of the share of renewable energies in energy consumption.
- An improvement of 32.5% in energy efficiency.
- The interconnection of at least 15% of the EU's electricity systems.

On 25 February 2015, the Commission published the Energy Union strategy (COM(2015)0080) with the aim of building an energy union that gives EU households and businesses a secure, sustainable, competitive and affordable energy supply.

On 30 November 2016, the Commission proposed the 'Clean energy for all Europeans' package[1]. It consists of eight legislative proposals covering governance (Governance of the Energy Union Regulation ((EU) 2018/1999)), electricity market design (the Electricity Directive ((EU) 2019/944), the Electricity Regulation ((EU) 2019/943), the Risk-Preparedness Regulation ((EU) 2019/941)), energy efficiency (Energy Efficiency Directive ((EU) 2018/2002), Energy Performance of Buildings Directive ((EU) 2018/844)), renewable energy (Renewable Energy Directive ((EU) 2018/2001)) and rules for the regulator, the EU Agency for the Cooperation of Energy Regulators (Regulation (EU) 2019/942 establishing ACER).

The last element of the package, the Governance of the Energy Union Regulation, was adopted on 4 December 2019. Under the regulation, EU Member States need to establish 10-year integrated national energy and climate plans (NECPs) for the period from 2021 to 2030, submit a progress report every two years and develop consistent national long-term strategies to meet the goals of the Paris Agreement.

Decision (EU) 2019/504 introduced changes to the EU's energy efficiency policy and the governance of the Energy Union in the light of the withdrawal of the United Kingdom from the EU. It made technical adjustments to the projected energy consumption figures for 2030 to correspond to the Union of 27 Member States.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:0860:FIN

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The cornerstone of EU energy efficiency policy is Directive 2012/27/EU on energy efficiency, which established a set of binding measures to help the EU reach its 20% energy efficiency target for 2020. The directive also introduced energy savings targets and many energy efficiency policies, including energy efficient renovations and mandatory energy certificates for buildings, minimum energy efficiency standards for a variety of products, energy efficiency labels and smart meters, as well as setting out consumers' rights. In December 2018, the revised Energy Efficiency Directive increased the overall EU target for 2030 to at least 32.5% (relative to the 2007 modelling projections for 2030). As part of the European Green Deal, the Commission proposed a review of the energy efficiency directive and published its assessment roadmap on 3 August 2020.

The amended energy performance of buildings directive (Directive (EU) 2018/844) sets out roadmaps with indicative milestones for 2030, 2040 and 2050 and long-term strategies for Member States to support the renovation of the national stock of residential and non-residential buildings, both public and private, with a view to creating a highly energy-efficient and decarbonized building stock by 2050. In October 2020, the Commission published the new renovation wave strategy (COM(2020)0662), which aims to double annual energy renovation rates in the next ten years.

The EU Eco-design directive (Directive 2009/125/EC) and the energy labelling framework regulation (Regulation (EU)2017/1369) define eco-design and energy labelling requirements for individual product groups (see fact sheet 2.4.8 on energy efficiency).

Existing and future energy market structures alone cannot deliver the desired level of renewables in the EU, therefore national support schemes and EU financing schemes are needed. One of the agreed priorities of the May 2013 European Council was to intensify the diversification of the EU's energy supply and to develop local energy resources to ensure security of supply and reduce external energy dependency. With regard to renewable energy sources, Directive 2009/28/EC of 23 April 2009 introduced a 20% target to be reached by 2020. In December 2018, the new Renewable Energy Directive (Directive (EU) 2018/2001) set the EU's binding overall renewable energy target for 2030 at 32%. This has been superseded by a target of 40% renewable energy target as part of the Green Deal[2]. Different strategies exist to boost the uptake of each renewable source (see fact sheet 2.4.9 on renewable energy). Likewise, as part of the European Green Deal, the proposed Just Transition Fund (COM(2020)0022) supports coal and carbon-intensive regions in making the transition to low-carbon energy sources.

- REACH for the registration, evaluation, authorization, and restriction of chemicals.

[2] https://secure.ipex.eu/IPEXL-WEB/dossier/document/COM20200022.do

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- RoHS (2) on restrictions on the use of certain hazardous substances in the construction of various types of electrical and electronic equipment.

The EU Waste from Electrical and Electronic Equipment (WEEE) rules aim to contribute and complement the already existing legislation that deals with a sustainable and circular manufacturing, use, repurpose, disposal and recycling needed because of the increasing number of electronics production and use. Main topics include improved sustainable production and consumption; increased resource efficiency; and a circular economy approach.

The 2015 F-gas regulation limited the total amount of relevant fluorinated greenhouse gases (F-gases) that can be sold in Europe, which it believes will drive the focus on climate friendly technologies. It bans the use of F-gases in new types of equipment where less harmful substances are available and prevents emissions of F-gases from existing equipment by requiring proper checks and servicing. These measures will ensure that the EU's F-gas emissions will be cut by two-thirds compared with levels in 2014.

This regulation is now being reviewed with regards to the European Green Deal and European Climate Law, as well as the lessons learnt since 2015. A new regulation is expected by the end of 2021.

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3 Policy review results

A policy review to assess current incentives and practices in public and private procurement was completed (with emphasis in green public procurement) of relevance to the HP market and to the development of skills demand.

This section of the report summarizes the information gathered at national/regional level and at European and international levels.

a. Spain

In Spain, the key policy development supporting the deployment of heat pump technologies is the updating of the Spanish Technical Building Code, to a much more open, favourable, and problem-solving orientation with respect to RES based air conditioning technologies and advanced measures of efficiency and energy saving.

This has led in turn to a subsequent review of the Building Thermal Facilities Regulation which incorporates and considers the impact of cost-effective and sustainable performance of HP technologies in comparison with conventional heating & cooling and S.H.W. (Sanitary Hot Water) supply. Both provisions are the basis for the deployment of the Energy Rehabilitation and Efficiency Plan which are aligned with the European Union's Renovation Wave. Both provisions are developed in more detail in the following sections, together with some examples of flagship initiatives, especially those drawn from the public sector as main prescriber and launching customer.

At regional level and due to its relevance in the future implementation of the HP4ALL regional development plan in Andalusia it is important to emphasize the existence and operation of REDEJA, the Andalusian Government common cooperation framework and network aimed at the optimization of energy efficiency, consumption, and performance of all its owned / rented buildings and facilities. In a similar way, REDEJA promotes, implements, and coordinates a full range of actions to improve energy efficiency in terms of energy consumption and demand reduction, RES integration and cost reduction and sustainability in energy supply contracting.

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Case study example 1	
Policy Name	Spanish Technical Building Code
Type	Regulation and best practices promotion
Area of Impact of important to HP4ALL	Thermal Installation
Link to Training	Indirect
Explanation of why it was chosen	Much more favourable to HP systems, without prescribing them directly
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Much more open, favourable, and problem solving oriented in its new drafting for the adoption of RES based air conditioning technologies and advanced measures of efficiency and energy saving.
Case study example 2	
Policy Name	New Building Thermal Installations Regulation (RITE)
Type	Regulation and best practices promotion
Area of Impact of important to HP4ALL	Thermal Installation
Link to Training	Indirect
Explanation of why it was chosen	Much more favourable to HP systems, without prescribing them directly
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	RITE follows a performance objective led approach for thermal installations in buildings, in accordance with the principle of technological neutrality, without prescribing the usage of a particular technique or material, thereby enhancing the uptake of emerging technologies and solutions (innovation procurement). Also, RITE imposes tough justifications and restrictions for the installation of conventional thermal systems instead of more efficient and sustainable ones -e.g., geothermal HPs & underfloor heating or solar thermal energy hybridization with natural gas boilers- so that the former must be motivated by a sound energy efficiency comparison between the opted solution and alternative one, notably those more technically, environmentally, and economically advanced. In addition, RITE requires that old time built, high-consumption buildings

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	take first steps to become smarter and contribute to GHG emissions reduction.
Case study example 3	
Policy Name	REDEJA
Type	Organizational measure
Area of Impact important to HP4ALL	Thermal facilities
Link to Training	Indirect
Explanation of why it was chosen	The importance of a centralized approach to allow for economies of scale and large-scale adoption of best practices. The effectiveness of a multifaceted, packaged combination of economic, legal, and administrative measures. The key role as early adopter / launching customer / gatekeeper of public administrations
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	The Energy Planning model promoted by the Andalusian Regional Government stipulates those public administrations must assume a catalyst and exemplary role aimed at achieving greater sustainability in energy supply and consumption. In this sense, a centralized management of energy investments and contracting and management procedures is set to deliver huge energy and economic savings throughout the whole Andalusian public owned /rented stock, in some cases above 40%. REDEJA stems from this as a new way of understanding and managing energy demand REDEJA pursues a significant energy efficiency improvement and a large-scale RES integration throughout the whole owned / rented real estate stock (buildings and facilities) of the Andalusian Regional Government.

Table 1. Case studies examples for Spain

b. Ireland

Under the Climate Action Plan, launched in 2019, the Irish government has set a target to retrofit 500,000 existing houses to a BER rating of least B2 and the installation of 600,000 heat pumps (400,000 in existing homes) by 2030[3]. The Climate Action Plan for Ireland also sets out the target to reduce CO_2 emissions by 30% from the non-ETS

[3] https://www.seai.ie/publications/Heat-Pump-Adoption.-Maximising-Savings..pdf

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sector by 2030 relative to 2005 levels[4]. Non-ETS sector emissions include emissions from homes, cars, small businesses, and agriculture.

The Climate Action and Low Carbon Development (Amendment) Bill 2021, strengthens the Climate Action and Low Carbon Development Act 2015 which set the framework for achieving national, EU and international climate targets and obligations. The bill also sets a constitutional commitment for achieving the 'National Climate Objective' (transition to 'climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy by no later than 2050) with a series of actions enabled by government to achieve the targets set in the Climate Action Plan 2019. The climate bill introduced a five-year 'Carbon Budget' for 15 years on a rolling basis. The carbon budget is to be used to achieve a 51% reduction in greenhouse gas emissions by 2030. The bill introduces requirements for government to put an upper ceiling on greenhouse gas emissions for each relevant sector as outlined in the Climate Action Plan 2019. The bill also mandates annual revisions of Climate Action Plan targets.

To achieve these legally binding targets, the Irish government is working towards energy efficiency of the residential sector by introducing a policy focusing on 'Residential Energy Efficiency'. The main objective of this policy is to provide access to grants, building improvements, a retrofit taskforce for the improving energy efficiency of dwellings[5]. The objective of the retrofit taskforce is to supervise design and development of Irish retrofit program to achieve the residential retrofitting and heat pump installation target[6].

Another policy that is in place is the Green Tender Actions Plan for public procurement by assisting public authorities in Green Public Procurement (GPP) from planning to implementation stage. This plan has objectives of reducing CO2 emissions, ozone depleting gases, and to increase energy efficiency in the country. The purpose of this action plan is to cover all aspects of energy efficiency in the country and to support implementation of all green motives by the public authorities.

The Department of Housing, Local Government and Heritage have defined a set of 'Technical Guidance Documents (A to M)' under building regulations to ensure safety and welfare of building and its occupants. The building regulation is applicable to design of new buildings or retrofitting an existing building. The building regulation defines the mandatory minimum performance requirement for buildings. The Technical Guidance Document Part L of the building regulations sets out performance compliance regarding 'Conservation of Fuel and Energy' to ensure buildings are within the specified energy levels in terms of emissions, heating, materials, and energy leakage. In 2019, Part L of building regulation have been updated to mandate the development of 'Nearly Zero Energy Buildings (NZEB)'.

[4] https://assets.gov.ie/25419/c97cdecddf8c49ab976e773d4e11e515.pdf
[5] https://www.gov.ie/en/policy-information/ffe6c5-energy-efficiency/
[6] https://www.gov.ie/en/publication/f2b3ee-retrofit-taskforce/

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To see the case studies identified (public and private) procurement policies identified in the Irish government, go to “Annex 8 – Policy – Case studies examples for Ireland”.

Case study example 1	
Policy Name	Housing Retrofit Taskforce
Type	Government Program
Area of Impact important to HP4ALL	One of the key objectives of the taskforce is to promote heat pump installation in Irish homes. The taskforce will benefit by the research outcomes and tools created by the HP4All project for the design and development of heat pump installation strategy for the national retrofit program.
Link to Training	
Explanation of why it was chosen	Housing retrofit taskforce is responsible for designing and developing nationwide retrofitting program to support government to achieve the CAP 2019 residential retrofitting targets and heat pump installation is major focus of all the retrofitting programs.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	The taskforce has a greater responsibility and will play a vital role for achieving nationwide energy efficiency target specified in CAP 2019 as taskforce is the starting point of designing and implementation of any new nationwide program in relation to energy efficiency improvement of the country.
Case study example 2	
Policy Name	Green Tenders Action Plan on Green Public Procurement
Type	Public procurement policy
Area of Impact important to HP4ALL	Green Tenders is the first Irish Green Procurement Action Plan. Its overall objective is to assist public authorities to successfully plan and implement green public procurement (GPP) tenders by highlighting existing best-practice and outlining and helping out with further implementation actions. The energy sector, and energy efficiency are the priority within this Action Plan. To this end energy efficient procurement -e.g., acquisition of low energy consumption appliances or equipment, sustainable energy supply, advanced energy services provision, sustainable and energy efficient capital investments etc.- is promoted and technically supported.

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	Research results of the HP4All project will be helpful to further plan and shape the Green Tender action plan for the energy sector by highlighting the role of heat pumps as a key technology
Link to Training	
Explanation of why it was chosen	Green tender procurement policy puts obligation on public authorities to make 50% green procurement for eight defined service/product area. Energy is one of eight defined service/product area and heat pump procurement will be supported as energy efficient procurement.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Strength: - Lower environmental damage, GHG emission, waste production Weakness: - No available option in green product/service, Opportunity: - Build green procurement opportunity, create green business opportunity, create knowledgebase of green product/services. Threats: - General perception of green product/service as costly product/service

Table 2. Case studies examples for Ireland

c. Italy

The Italian air conditioning system industry is now recognized as a world leader in the sector. In the field of air conditioning, the most widespread technology today is the heat pump, of which the Italian industry has an excellent European and international reputation. About 1 million heat pumps are sold on average every year in the Italian market. In the last few years after the economic crisis, this value has started to grow again with about 1.4 million heat pumps sold in Italy in 2018[7].

In terms of economic effects related to the development of thermal renewables from heat pumps, in 2017 GSE, the Italian company owned by the Ministry of Economy and Finance to which numerous activities of a public nature in the energy sector are assigned, estimated investments of approximately €2.1 billion for the installation of the plants and €2.95 billion of expenses for the related management. and maintenance, as well as an added value produced by the sector of thermal renewables from heat pumps equal to €3.3 billion.

There are several policy measures that continue to support heat pump deployment, both for their wide margin for technological improvement, in terms of minimum energy consumption and environmental impact, and for their growth potential in the construction market.

[7] WHITE PAPER ON HEAT PUMPS - 2020 - Assoclima

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More detail on Italian initiatives that encourage the use and installation of heat pumps can be found “Annex 9 – Policy – Case studies examples for Italy”.

Case study example 1	
Policy Name	Relaunch Decree n.34 (Superbonus 110%)
Type	National Decree which, among the health, support for work and economy measures addressed, includes the Superbonus 110% initiative, a tax deduction due for specific interventions in the field of energy efficiency.
Area of Impact of important to HP4ALL	The installation of heat pumps and hybrid systems is included in the 110% Superbonus. The directive allows citizens to improve their building energy performance, stimulating a positive response even from subjects who would not normally be interested because the technology is considered too expensive or not clear.
Link to Training	The Relaunch Decree does not directly provide a link with training activities for installers or experts in the sector but is linked to the dissemination of knowledge in the field of energy efficiency to citizens. The initiative allows to increase knowledge on energy efficiency since citizens can personally achieve a benefit and are therefore more interested in investigating the issue and finding out what they can achieve through these measures.
Explanation of why it was chosen	Relaunch Decree n.34 and the consequent Superbonus110% provided is the largest initiative in Italy that allows the diffusion of the installation of heat pumps, devices, and other intervention for the energy efficiency of buildings.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	This initiative is a great opportunity to invest in requalification actions and in the energy transition and to shorten the economic barriers of citizens who can be encouraged in actions to improve the energy efficiency of their buildings that would normally not be attractive. However, the request to benefit from these incentives is not so simple and immediate. A simplification of the procedures is needed, as well as greater information on the tool to the interested public that could increase its effectiveness. The development of tools such as those envisaged by the HP4ALL project that allows the dissemination of information related to initiatives, technologies, support schemes can further increase their use and consequently the installation of the technology supported by these schemes.
Case study example 2	

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Policy Name	Thermal Account
Type	Ministerial Decree
Area of Impact of important to HP4ALL	The installation of heat pumps and hybrid systems is rightfully included in the decree's incentives. The directive allows citizens to improve their building energy performance, stimulating a positive response even from subjects who would not normally be interested because the technology is considered too expensive or not clear. It considers the energy efficiency issue from the end users' perspective, influencing their decisions and planning for new innovations strategies.
Link to Training	The Thermal account, exactly as the Superbonus 110%, does not directly provide a link with training activities for installers or experts in the sector but is linked to the dissemination of knowledge in the field of energy efficiency to citizens. The initiative allows to increase knowledge on energy efficiency since citizens can personally achieve a benefit and are therefore more interested in investigating the issue and finding out what they can achieve through these measures.
Explanation of why it was chosen	It represents a great opportunity to invest in requalification and in the energy transition and to shorten the economic barriers of citizens who can be encouraged in actions to improve the energy efficiency of their building that would normally not be attractive
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	It establishes the criteria, conditions, best practices, and methods for carrying out energy efficiency interventions. It implements the so-called "Thermal Account", a specific support scheme for small-scale interventions to produce thermal energy from renewable sources and increased energy efficiency. Normally these kinds of initiatives are not easy to access and present a complex process with not so clear conditions. The development of tools such as those envisaged by the HP4ALL project that allows the dissemination of information related to initiatives, technologies, support schemes can further increase their use and consequently the installation of the technology supported by these schemes

Table 3. Case studies examples for Italy

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d. Upper Austria

Upper Austria, one of Austria's 9 regions with a population of 1.5 million, is well on its way in the clean energy transition: 73% of the electricity, 56% of all space heating and 31% of the primary energy come from renewables. Through significant increases in energy efficiency and renewable energy, greenhouse gas emissions from buildings have been reduced by 32% in the last 10 years. Around 6% of Upper Austrian dwellings are equipped with heat pumps, and the trend is increasing.

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 fall within the responsibility of the regions. 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.

The regional government's decarbonisation target (which includes eliminating oil and gas heating) is a key driver for the HP market. The policy framework that is put in place to achieve these goals supports the development and implementation of high efficiency and renewable solutions – including heat pumps. Stringent efficiency criteria and thresholds for noise emissions 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. More detail the Upper Austria policies, can be found in "Annex 10 – Policy – Case studies examples for Upper Austria".

Case study example 1	
Policy Name	Energy Advice Service of the ESV
Type	Information and advice service
Area of Impact of important to HP4ALL	The service reaches potential end-users while they are in an actual decision-making / investment process. This is a key time for influencing good decision-making towards efficient and renewable systems such as HPs.
Link to Training	Indirect

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Explanation of why it was chosen	Supports the development of the HP market by triggering and supporting energy efficiency and renewable energy investments (including HPs), supporting stakeholders throughout the customer journey, and ensuring high-quality of the installations.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Key aspects of the advice service are product independence, strong customer orientation and uncomplicated, fast, and free advice. The energy advice service accompanies people and companies in their decision-making process, supports them in investing in energy efficiency and renewable (including HPs), and helps them find the right funding option for their project. It works best if the programme is embedded in a wider policy framework including regulatory measures "sticks", financial incentives "carrots" and information and training activities "tambourines". This has shown to be very successful in Upper Austria. The long-term commitment and funding by the regional government is a crucial success factor.
Case study example 2	
Policy Name	Efficiency criteria for HP funding programmes
Type	Regulatory measure
Area of Impact of important to HP4ALL	Development and implementation of high efficiency and renewable HP solutions
Link to Training	Indirect
Explanation of why it was chosen	It is a good example of how legislation for buildings and heating and cooling systems are strategically used to drive innovation by regularly updating them towards higher efficiency and lower emissions.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Setting criteria for funding programmes creates market pull, since end-users require HP systems that fulfil these criteria from manufacturers and planners. It ensures the installation of high efficiency and renewable HP solutions. It fosters high customer satisfaction and user acceptance and drives innovation in the HP sector.
Case study example 3	
Policy Name	Upper Austria's decarbonisation target ("AdieuÖl")
Type	Regional policy
Area of Impact of important to HP4ALL	The policy framework that has been put in place to achieve the regional government's decarbonisation goals (which include eliminating oil heating by 2035) supports the development and implementation of high efficiency and renewable solutions – including heat pumps.
Link to Training	Indirect

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Explanation of why it was chosen	It underlines the importance of regional targets and policies in driving the energy transition and the development of the HP market.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	The regional government's decarbonisation goals and the comprehensive set of measures put in place to achieve them are a key driver for the HP market. Clearly identifying who to address with policy and information measures was an important step for developing an effective communication strategy. The AdieuÖl campaign reaches out to people in their social environment, motivates them to participate in multiple ways, and uses the power of civil society and community to build up momentum for the energy transition.

Table 4. Case studies examples for Upper Austria

e. European Union

The European Union has always been at the forefront of innovation in the lifelong learning field, with programmes such as: Erasmus Plus, Erasmus Mundus, the EVS (European Voluntary Service), Erasmus Entrepreneurship, as well as individual National schemes, bi-lateral agreements on exchanges between organisations from countries (e.g., Erasmus Mundus Consortiums). More detail on Europe wide policies can be found "Annex 11 – Policy – Case studies examples for Europe wide".

Case study example 1	
Policy Name	The Green Deal
Type	EU action plan/policy
Area of Impact of important to HP4ALL	The Green Deal affects all aspects of legislation, targeting the economy and industry. It will help industries to adapt to the green transition, which also involved helping citizens to up skill, so they are not left behind.
Link to Training	The commitment to a Just Transition will ensure that no one is left behind and will commit financing to ensure re-skilling opportunities. Additionally, a focus on decarbonization will mandate that more green jobs are created, thus creating a demand for training.
Explanation of why it was chosen	The green deal was chosen as it affects all aspects of the economy and industry and is one of the most important policies of the von der Leyen Commission.
Description of the Strengths, Weaknesses,	One of the many strengths of the green deal is that collective action of governments is needed to achieve the ambitious climate targets which are set for decarbonization. It supports vulnerable aspects of society through the Just Transition,

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Opportunities and Threats of this policy	which is highly important, to limit the negative societal affects that the green transition could cause. The Green Deal has also caused some contention, as some commentators feel that is does not go far enough with its ambition. This contention can also be seen in the inter-institutional negotiations, as the European Parliament voted to lower greenhouse gas emissions by 60%, rather than the 55% target proposed by the Commission and Council.
Case study example 2	
Policy Name	Build Up Skills
Type	Commission initiative
Area of Impact of important to HP4ALL	Build Up Skills works to increase the number of qualified building professionals across Europe to deliver an increase in building renovations as well as new nearly zero-energy buildings (NZEBs).
Link to Training	The Commission has realized that to increase the number of renovations and NZEBs in Europe, there is a lack of construction skills, and therefore training must be provided in order to rectify this.
Explanation of why it was chosen	Build Up skills was chosen as it is directly focusing on the construction industry and identifies issues that training workers can resolve.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	The Build Up skills initiative is providing 40 million euros of EU funding, which is a massive boost to the sector. The scope of the initiative is also being expanded beyond construction workers to 'white collar' workers, which means more workers will benefit from the scheme. It is also estimated that more than 32000 workers will be trained by 2022.
Case study example 3	
Policy Name	European Climate Pact
Type	EU-wide initiative
Area of Impact of important to HP4ALL	In its initial phase, the Pact will priorities areas which benefit the environment as well as the health and wellbeing of citizens. One of the four areas of focus is green skills.
Link to Training	The Commission acknowledges that the transition to a climate-neutral economy will affect a whole range of sectors, therefore they need to: - Promote and support green employment - Address the skilling and re-skilling of workers - Anticipate changes in workplaces in the future
Explanation of why it was chosen	This pact was chosen because it puts a great emphasis on the need to prepare for the green transition through up- and re-skilling.

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Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	One of the main benefits of the European Climate Pact is that it has an open mandate and so its scope will change depending on the ideas submitted to it by organizations and individuals. This means that ideally, the issues that are affecting industries should be at the forefront of importance. This said, the scope of the Climate Pact is currently limited, and could be said to be reactive rather than actively planning years into the future to address the challenges that industry faces.
Case study example 4	
Policy Name	European Skills Agenda
Type	Five-year plan
Area of Impact of important to HP4ALL	The European Skills Agenda was created to given citizens the correct skills to benefit from the green and digital twin transitions. It will strengthen sustainable competitiveness, ensure social fairness, and build resilience in the face of crisis, such as experienced during the recent pandemic.
Link to Training	The agenda will ensure that people have the right skills for the right jobs. This is addressed in a number of actions, for example in action 5: 'skills to support the twin transitions', action 5: 'skills for life' and in a number of other actions. There are also three other actions which heavily link to skills, for instance a call to join forces in collective action, tools, and initiatives to support people in their lifelong learning pathways, and a framework to unlock investment in skills.
Explanation of why it was chosen	The European Skills agenda was chosen as it is heavily focused on actions to be taken to give EU citizens the skills they will need in future job markets, and as a response to the green transition.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	The European Skills agenda sets out several actions to ensure that skills are prioritized in the next five years. Its scope is wide and encompasses numerous professions and ways of learning, from universities and STEM graduates to vocational training. However, it can be argued that the timeline is not long enough, as it only covers the next five years. If workers are to be adequately trained to prepare for the green transition, there must be further provisions as Europe decarbonizes.

Table 5. Case studies examples for Europe wide

f. EU and Associated countries

At national level within the EU, it is worth mentioning some relevant policy packages adopted by several countries wherein the share of heat pumps is high (*International*

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Comparisons of Heating, Cooling and Heat Decarbonisation Policies. Vivid Economics 2018):

France

Although a large majority of France's electricity comes from nuclear generation, it has a more mixed use of energy for heat. Heat demand has increased overall, and so have done natural gas consumption and heat pump installations. Sales of heat pumps have increased so significantly that France is now one of the largest markets for heat pumps in the EU.

France is undertaking a heating transition based on a combination of targets, regulations, and fiscal policies, key elements of which being:

-The Crédit d'Impôt pour la Transition Énergétique (CITE, Tax Credit for Energy Transition), which supports residential purchases of energy efficient and renewable energy equipment through a tax credit of up to 30% of capital costs, with a limit of €8,000/€16,000 for an individual/a couple, with an additional €400 per household dependent. Additionally, renovation projects that are eligible for the CITE credit can also benefit from a reduced Value Added Tax (VAT) rate of 5.5%, compared to the standard rate of 10% for residential renovation projects.

-The 0% interest Eco-loan up to €30,000 for energy-efficient residential renovations, including the installation, regulation, or replacement of heating or hot water systems, including those using renewable energy.

-The commercial sector-focused Fonds Chaleur (Heat Fund), which supports the deployment of renewable heat and district heating, through subsidies for both project development (40%-80% of costs) and project implementation (25%-80% of costs).

-Preferential-rate loans for domestic energy saving projects through the Livret de développement durable et solidaire (LDDS), is a fixed-rate savings account established, with banks required to allocate a share of the funds raised through these accounts to finance energy-saving projects in older buildings.

-The Régulation thermique, requires all new buildings (constructed after 1 January 2013) to achieve primary energy consumption below 50 kW/m2 per year, de facto eliminating the possibility of direct electric heating.

-Carbon tax (taxe intérieure de consommation sur les produits énergétiques) which applies to CO2 emissions from the industry, buildings, and transport sectors (with exemptions for operators covered by the EU emissions trading system). The carbon

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tax may play an important role in maintaining the relative competitiveness of renewables compared to gas options for new builds and retrofits.

The combination of regulations and fiscal support (both subsidized capital costs and subsidized loans) has contributed to a substantial increase in heat pump installations in new buildings.

Germany

Share of heat pumps in new homes in Germany has increased from less than 1% in 2000 to 23% in 2016 as a result of building standards, financial support, and changes in VAT rates.

The *Market Incentive Programme (MAP)* for renewable heat offers grants for small-scale renewable heat systems including heat pumps, and low-interest loans for industry and district heating. Investment grants are available for heat pumps with a minimum COP and small solar thermal installations. The MAP provides a core subsidy and various additional subsidies, according to the type of heat pump and the project. Heat pumps need to be certified with the EHPA Quality Label to access the subsidy. Extra support is available for innovative renewable heating technologies or combinations of different technologies (for example, combining heat pumps with solar heating and water storage tanks).

The KfW development bank provides soft loans for larger scale heat pump systems and supports the building or purchase of energy-efficient homes with a grant or loan if their energy consumption is to fall within the German Energy Efficiency Ordinance requirements.

Finally, it is important to note several information provision and awareness raising campaigns implemented as a response to technical problems and lack of installation experience with heat pumps as far back as in the 80s. More recently, utilities and energy agencies have led information campaigns to raise consumer awareness about heat pumps. For example, in the German region of North Rhine-Westphalia the marketing activities of the NRW Energy Agency and the RWE utility have been linked to sustainable heat pump market growth.

Netherlands

The Netherlands have long emphasized the need for significant innovation to make further progress in heating and cooling, including the use of aquifers for heat storage, hybrid heat pumps and a better alignment between energy efficiency, residual heat, and renewables. In view of the depletion of its main source of gas within 17 years (the Groningen gas field) a diverse mix of heat sources is foreseen, including district heating

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in dense urban areas and heat pumps in less densely populated and well insulated houses.

Under the auspices of the Dutch Energy Agenda, the Netherlands is phasing out gas, with an aim to reduce emissions from low temperature heat processes by 80-95% in 2050. To meet these ambitions, 6-7 million households need to become gas free in 2030-2050. The expected Dutch energy mix contemplates green gas, geothermal, district heating and electrification. Official projections (Gasunie) estimated that the split in 2050 would be 50% district heating, 25% electric heat pumps and 25% hybrid heat pumps supplied with green gas. Nevertheless, Delft studies depict more favorable 2050 scenarios for heat pumps, when all the heat supply would be provided through electrification and green gas heat pumps. Another more balanced scenario roughly converged with the Gasunie estimate and saw green gas meeting 17% of heating demands, electricity 31% and district heating 52%. Lately, the Dutch Coalition Accord seems however to have further emphasized insulation, energy efficiency, heat pumps and district heating, with neither green gas nor geothermal being mentioned.

The most important instrument put in place by the Dutch Government is the Stimulation of Sustainable Energy Production Scheme (SDE+). It is an operating grant that provides financial compensation for renewable electricity, renewable gas, and renewable heat (or a combination of renewable heat and electricity).

The SDE+ has been complemented by a package of policies which aim to incentive renewable heating, and decarbonize new building stock amongst which**:**

-ISDE+: A fund which subsidizes renewable heating installations, including heat pumps, in households and businesses. The subsidy for a heat pump boiler is €500 (regardless of capacity), while a hybrid heat pump is 1.000 € for thermal power up to 5kW, plus 100 € for every kW over this level up to 1.500 €.

-Heat tariffs preempting district heating, to be supplied at a rate lower than that of an individual gas boiler. There are also plans to shift part of the current tax on electricity onto gas.

-Energy standards for new constructions have been continuously strengthened culminating in new dwellings being close to carbon neutral by 2020, and government buildings by 2018.

-Research and innovation: The Dutch Government, through the state-owned energy company Gasunie is focusing its efforts on hybrid heat pumps combined with green gas and smart power control systems.

Norway

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The heat pump market in Norway has also witnessed strong growth in the last 10 years, mainly due to policies implemented in response to hydro capacity constraints, increasingly high electricity costs for end-users and subsidies for heat pumps. A large proportion of buildings transitioning to heat pumps were previously using direct electric heating, therefore transition to heat pumps reduced electricity demand.

The main components of the Norwegian HP related policy mix include subsidies for HPs, energy performance labelling, ban on oil boilers from 2020 and investment aid for energy measures in households through several intermediaries which offer:

- Investment aid to households undertaking energy efficiency measures or RES conversion from fossil fuel heating sources

- Financial incentives for new homes incorporating advanced heating technologies.

- Loans for builders to incorporate technologies such as HPs, solar systems, and biofuel boilers in new construction.

Sweden

Sweden produces no natural gas and has a negligible number of households connected to it. Key technologies for supplying heating in buildings currently include district heating and heat pumps, the latter being installed in about a fifth of dwellings.

Prior to the shift to district heating, biomass and heat pumps, Sweden relied on oil and direct electric heating to a large degree. Today, oil use is taxed heavily whereas the use of biomass and heat pumps has been promoted through subsidies, which led to oil boilers being substituted by heat pumps and/or mainly biofuel-based alternatives like biomass boilers.

In the last two decades, the use of individual heat pumps has expanded significantly and has emerged as the main competitor to district heating: heat pumps now supply almost a quarter of heating to residential and service sector buildings. The share of heat pumps supplying one- or two-family dwellings is 52% - equivalent to 1 million heat pumps. Heat pumps have mainly replaced oil boilers, direct electric heating and electric boilers.

Sweden has used a mix of policies to drive a transition from electric resistive and oil-fired heating to heat pumps and district heating. Historically, this included a range of subsidies and tax incentives. Quality standards also helped to ensure that heat pump systems achieve high levels of performance.

Subsidies for households to switch from oil and direct electric heating to heat pumps, district heating or biomass have been available for more than 20 years. These take the

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form of an up-front grant where homeowners could receive up to 30% of material and labour costs up to a maximum level per household. The subsidy to replace direct electric heating provided a higher maximum grant than the oil heating replacement subsidy, due to the additional costs of installing central heating, and led to 80% of the subsidies being awarded for a shift from electric heating to district heating. With respect to the subsidy for replacing oil heating in one- or two-family homes, heat pumps were the most popular replacement, accounting for 43% of the awarded subsidies and district heating for 20%.

The heat pump market in Sweden has also been supported through technical standards, for example the P-label quality mark for heat pumps, and the Swan label (with a specific eco-label for heat pumps), as well as installer certification training. In addition, there have been information campaigns about energy efficiency and alternative, lower carbon heating technologies such as heat pumps. In addition, Swedish building codes have contributed to the increasing dominance of air-to-air heat pumps over ground sourced heat pumps.

Finally, The Swedish Energy Agency has got a research and development programme of more than thirty years now, much of which focused on heat pumps. This has resulted in many improvements including the efficiency of compressors, and reliability and confidence in large scale water source heat pump projects for the commercial sector. The high uptake and high confidence of heat pumps in Sweden has been attributed in part to the longstanding R&D programme.

g. International level

Regulations and standardization

According to a recent International Energy Agency report[8], *regulations*, *standards,* and *labelling*, along with technology progress, have spurred HP market improvement globally.

For instance, the average HPs Seasonal Performance Factor (SPF) sold in the **United States** rose by 13% in 2006 and 8% in 2015 following two increases in minimum energy performance standards[9]. The United States mandates that HPs be labelled with a SPF for heating as well as minimum energy performance standards.

[8] IEA (2021), Heat Pumps, more efforts needed. IEA, Paris https://www.iea.org/reports/heat-pumps

[9] It is expected that this rate of use of HPs will increase to 8.1% by 2027, according to the North America Residential Heat Pump Market Report 2021-2027, with the main growth factors being represented by: an increasing demand for efficient heating and cooling from end users; surging demand for space heating and cooling; favorable policies that encourage the adoption of HPs.

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Leading this effort, the California Energy Commission approved in August 2021 a new Building Energy Code that encourages the installation of HPs for space and water heating in new buildings (or as an alternative to meet more stringent building energy efficiency requirements), while also promoting solar PV installations and battery storage use. Entering into force in 2023, this new building code will set HPs as the baseline heating technology. This milestone echoes actions in multiple US states and cities that are bolstering the electrification of heat, or simply banning fossil fuels (as in France, the Netherlands, etc.).

IEA considers that further improving the vapor-compression cycle through next-generation components will require system-oriented solutions to optimize the whole-building energy use and the use of refrigerants with very low or zero global warming potential. Again, improved performance and environmentally friendly solutions will have their say in standards and labelling schemes.

In this sense, the Environmental Protection Agency also recently removed eligibility to top rating for gas heaters in the Energy Star Programme. Other policy signals, such as carbon intensity expectations for heating equipment, would also encourage greater HP adoption.

In **China**, the ambient heat used by HPs is classified as renewable heat, which unlocks access to other incentives such as tax rebates.

More generally, the **IEA**[10] considers, in line with the REPowerEU Initiative, as an optimal solution the combination of:

- HPs regulatory performance-based labels with energy use and emissions criteria, and

- Integration with other sustainable solutions, e.g., renovation, greater use of onsite or local solar PV generation, and smart controls to synchronize HP operations with times when the grid's emissions intensity is the lowest. The HP would thereby directly consume locally produced green electricity, reducing its net electricity consumption from the public grid, and minimizing the emissions intensity of the electricity it consumes. Connecting to on-site solar PV panels and participating in demand-response markets will make HPs more attractive

Financing, pricing, and subsidies

In **China**, subsidies under the Air Pollution Prevention and Control Action Plan are helping reduce HPs upfront installation and equipment costs. China's Ministry of Environmental Protection established financial subsidies, ranging from USD 1 100 to

[10] IEA Heat Pumping Technologies Technology Collaboration Programme https://heatpumpingtechnologies.org/

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4 350 (CNY 7 400 to 29 000) for households purchasing air-source HPs in 2020 in Beijing, Tianjin, Shanxi, Hebei, and Shandong.

Japan's Energy Conservation Plan follows a similar scheme. Japan is promoting HPs through subsidies, tax incentives and R&D finance support as well as energy efficiency policies to meet its renewable heat objectives.

The Top Runner Programme covers energy efficiency standards for heating and cooling appliances and is supported by public and private R&D finance, in close collaboration with large commercial firms. The Ministry of Economy, Trade, and Industry (METI), assisted by Japan's New Energy and Industrial Technology Development Organization (NEDO), has played a critical role in devising the road map and facilitating the successful collaboration between key market participants, R&D institutes, and policy makers. Other programmes specifically target ground-source HPs.

The **United States** recently extended the 26% federal tax credit for new residential ground source HPs until the end of 2022. In **China** (Beijing), 30% of the initial investment cost is also covered by the state. To help achieve its ground-source HP deployment target of 700 million m^2, **China** has proposed complementary subsidies (CNY 35/m^2 to CNY 70/m^2) for other areas such as Jilin, Chongqing, and Nanjing.

Pricing keeps being the main deterrent factor to HPs deployment worldwide. Policies therefore need to address these kinds of barriers to adoption: high upfront purchase prices, operational costs, and the legacy of the existing building stock. Unfortunately, in many markets worldwide, the installed costs for HPs relative to potential savings on energy spending (e.g., when switching from a gas boiler to an electric heat pump) often mean that HPs may be only marginally less expensive over 10 to 12 years, even with their higher energy performance.

Since 2015, subsidies have proven effective to offset the upfront cost of HPs and initiate market dynamics that accelerate their uptake in newly constructed buildings. As an example, the **United Kingdom**, which targets 600 000 new units per year until 2028, will be relying on grants and fiscal incentives to promote their use. Meanwhile, in **Canada** British Columbia is offering no-interest loans to replace fossil fuel boilers with HPs.

Renovations and heating equipment replacements could also be part of a single policy framework, as accelerating deployment in new buildings alone will not be enough. Deploying renovation packages involving both building shell elements and equipment upgrades would also reduce HP installation costs (by cutting its size), which can make up around 30% of the total capital cost of an air-source HP and 65-85% for a ground-source HP.

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High electricity prices are still major barriers in most markets, partly due to fossil fuel subsidies and electricity taxes. Electricity prices globally (in USD per kWh equivalent) are approximately twice as high as natural gas prices and can be as much as three or more times higher in some markets. Narrowing the gap between electricity and natural gas prices would accelerate uptake in market segments that are already expanding (e.g., air-source HPs for new buildings) and foster deployment in new ones (e.g., existing buildings).

Similarly, large-scale HPs are commercially available but face market-design barriers. Lifting taxes on the electricity used in power-to-heat applications would facilitate their uptake.

In this context, it is important to note that the use of electricity for heat is higher in countries with abundant renewable indigenous resources, facilitating the adoption of HPs (as in the case of Scandinavian countries in the EU). As an example, **New Zealand** feature at the top and have the highest proportion of electricity in their heating renewable fuel mix; also the **United States** and **Canada** score high as they produce over 25% of heat from electricity.

Overall policies

Some more details of HP related policies worldwide are given below:

-**Canada**: Capital grants and subsidies, soft loans, and tax incentives. The ecoENERGY for Renewable Heat Programme encouraged solar thermal equipment for heating and cooling and water heating; the Renewable Energy Deployment Initiative promoted solar hot water and space heating systems, biomass combustion systems and ground source HPs.

-**Japan**: Energy efficiency standards for buildings and appliances (including space heaters); government financed HP efficiency R&D; loans, tax incentives, grants and subsidies for building energy efficiency (including heat).

The Rational Use of Energy Act sets energy efficiency standards for residential and commercial buildings. The Top Runner Programme covers energy efficiency standards for household appliances, equipment, vehicles and building materials.

The Improvement of Energy Consumption Performance of Buildings Act introduced mandatory efficiency standards for large new buildings and new residential buildings (starting 2020). The policy provides financial incentives and performance labelling.

Subsidies and loans for renewable heat: Loans schemes for SMEs are available for up to JPY 720 million with a maturity of 15 years. This scheme has been paired with a national R&D project aimed at increasing HP efficiency.

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For homeowners, tax incentives were introduced in 2009 for energy efficient home renovation where 10% of renovation costs up to JPY 2.5 million can be deducted from that year's income tax

-**New Zealand**: In New Zealand, the Energy Efficiency and Conservation Strategy gives support for energy-efficient homes, which has permitted that the share of heat pumps in residential buildings be increased significantly in the last ten years, replacing fossil fuel-based heating. This has been a result of intensive subsidizing programmes that encourage heat pumps take up[11]. The Energy Efficiency and Conservation Authority (EECA) Warm Up New Zealand programme has supported HPs by providing funding for insulation retrofits and heating retrofits, including HPs deployment aid. Installation rates have been between 90,000 and 120,000 per annum in recent years.

Such a rapid uptake of HPs in a short period -in particular, the size of the market tripled in the last 5 years- suggests that this transition is not only possible but could proceed relatively quickly.

-**United States**: Market and financial instruments prevail within the United States Policy mix such as Federal tax credits, State level RES Portfolio Standards (RPS) and rebates. The Residential Energy Efficient Property Credit tax provides tax credits of up to 30% of qualified expenditures for using energy efficient systems.

It is also worth mentioning the California State Solar Initiative, a ten-year programme to put solar on a million roofs in the state of California, very similar to the EU Solar Strategy, with clear influence in the deployment of hybrid HP systems.

-**China:** Heat used by HPs classified as renewable heat; RES Portfolio Standards (RPS); tax rebates. HP specific subsidies

As shown above wherever the share of HPs is higher (New Zealand and Norway, and within the EU in Sweden and Germany, see section 3.e):

-Oil use is taxed heavily, which led to oil boilers being substituted by HPs and/or mainly biofuel-based alternatives like biomass boilers

-HPs have been specifically and intensively promoted through dedicated subsidies

-Conventional electric heating has been phased out

-Building and equipment standards, financial support and changes in VAT rates were also included in the policy mix.

[11] It is important to note, though, that over 60% of households in New Zealand use heat pumps for cooling rather than heating

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In all cases combination of market forces (oil crisis, climate change and resulting high pricing) planning, regulation, taxation, and incentives brought around a transformation of HPs provision[12]. More information is given within Annex 12

Case study example 1 - Canada	
Policy Name	Policy on Green Procurement
Type	Policy on Green procurement
Area of Impact of important to HP4ALL	As Green procurement requires an understanding of the whole lifecycle of goods and services being acquired from resource extraction through to disposal, including the total cost of ownership, the relevant risks and opportunities, the environmental and economic costs, or benefits to society, and any environmental or economic non-monetized positive or negative impacts to society, the skills, or professionals all along the value chain need to be taken into consideration. As such, the skills from designers (design phase) to installers (installing phase), maintenance staff (maintenance) and even updating/upgrading and replacement/disposal personnel need constant re-skilling and up-skilling.
Link to Training	The skills or professionals all along the value chain need to be taken into consideration for the Canadian Government to influence the demand for environmentally preferable goods and services, the ability of industry to respond to the escalating use of environmental standards in global markets, and the resiliency of Canadian assets to climate change.
Explanation of why it was chosen	Green procurement requires an understanding of the whole lifecycle of goods and services being acquired from resource extraction through to disposal. The policy also supports the federal government in targeting specific environmental outcomes where procurement can effectively be used to mitigate the impact of – or adapt to – environmental issues such as climate change and can support the protection of biodiversity, natural areas, air, soil, and water.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Key challenges: - maintaining procurement competition while advancing greening - balancing environmental and other procurement objectives

[12] International Comparisons of Heating, Cooling and Heat Decarbonization Policies (2017). Vivid Economics & Imperial College London

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	- high volume and variety of purchasing and people involved - the need for horizontal collaboration and strong engagement. - the policy must be updated as per changing requirements, standards, or relevant additional instruments. Key opportunities: - Green procurement involves a lifecycle approach that encompasses all levels of production. - Green procurement is made as an investment and keeping in line with value for money propositions, meaning that it is economically feasible as prior processes. - Using a principles-based approach to keep pace with advances in technology and ensure that reductions in environmental impact are measured over the life cycle of a good or service. - Using a phased approach to maintain competition and seek continual improvement.
Case study example 2 – California (USA)	
Policy Name	Building Energy Efficiency (Energy Code)
Type	State and federal
Area of Impact of important to HP4ALL	The California State Government intends to regulate and promote the efficient construction of buildings in which heat pumps can be installed, which fits with HP4ALL's ambition to enable end users/customers to demand high quality solutions. Furthermore, this law focuses on the use of these competences to prepare for the ecological transition, which benefits technologies such as heat pumps over traditional heating and cooling methods.
Link to Training	For costumers to be able to demand high quality, renewable solutions, professionals all along the value chain need to be skilled enough to provide those. The skills from designers (design phase) to installers (installing phase), maintenance staff (maintenance) and even updating/upgrading and replacement/disposal personnel need constant re-skilling and up-skilling.
Explanation of why it was chosen	The policy's focus on efficient construction of buildings and the energy transition fits with HP4All ambition to enable end users to be demand high quality solutions and benefits technologies such as heat pumps over other traditional heating and cooling services.

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Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Key challenges: - The policy is not regulated by the federal energy sector, nor specifically by the local energy sector, but will depend on what specific activity is planned to be carried out to determine what kind of permit will be required. - The Government should improve the environment and encourage diversity of energy sources through improvements in energy efficiency and the development of renewable energy resources, such as wind, solar and geothermal energy. - The Government should minimise the cost to society of reliable energy services provided by natural gas and electricity. Key Opportunities: - The policy allows for an all-electric pathway for compliance in addition to the existing mixed-fuel pathway. Doing so will allow California to take advantage of its success developing photovoltaic (PV) systems as a carbon-free energy source and use of heat pumps in residential and non-residential buildings while continuing to offer the flexibility of mixed-fuel options. - Currently there is a complementary certification by the California Energy Community that focuses on training, certifying, and overseeing installers and their employers (Acceptance Test Technician Certification Providers (ATTCP))
Case study example 3 - China	
Policy Name	Law on the Promotion of Renewable Energies & Five-Year Plan for Renewable Energy Development
Type	National 5-year plan
Area of Impact of important to HP4ALL	The Law on the Promotion of Renewable Energies & Five-Year Plan for Renewable Energy Development aims to regulate and promote the efficient construction of buildings in which heat pumps can be installed, which fits in with HP4ALL's ambition to enable end users/clients to demand high quality solutions. Additionally, this act focuses on using these skills to prepare for the green transition – which benefits technologies such as heat pumps over traditional heating and cooling methods.
Link to Training	For customers to be able to demand high quality, renewable solutions, professionals all along the value chain need to be skilled enough to provide those. The skills from designers

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	(design phase) to installers (installing phase), maintenance staff (maintenance) and even updating/upgrading and replacement/disposal personnel need constant re-skilling and up-skilling.
Explanation of why it was chosen	The policy's focus on efficient construction of buildings and the energy transition fits with HP4All ambition to enable end users to be demand high quality solutions and benefits technologies such as heat pumps over other traditional heating and cooling services.
Description of the Strengths, Weaknesses, Opportunities and Threats of this policy	Key challenges: - The existing electric power operating mechanisms do not meet the needs of large-scale development of renewable energy. - Renewable energy is strongly dependent on policy support (At present, the costs for power generation from wind, solar, biomass etc is still relatively high compared to those for conventional fossil-based electricity generation, relatively high subsidies per kWh are required, and there is a large deficit in funds for subsidies.) - To incentivise their use in both new and existing buildings, local governments should design incentives and benefits, and should themselves use these technologies in public buildings and utilities where appropriate. - Renewable energy is not yet being used effectively (Although the installed capacity of renewables, in particular that of modern renewables, has grown rapidly year after year, the responsibilities and obligations of different market players with respect to the utilization of renewable energy are not clear, the efficiency of the utilization is not high, there is a clear issue of a strong focus on construction, and a weak focus on utilization, and there is an imbalance and lack of coordination between supply and demand, resulting in the potential for sustainable development of renewable energy not being fully realized.) - Despite general guidelines that mandate the simplification of procedures, in most cities it is necessary to deal with various authorities - such as energy, urban development, environmental, among others - to obtain authorisation for the use of geothermal energy, as there is no clear regulation

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	regarding which authority should be responsible for issuing authorisations. Key opportunities: - The cities that have had the greatest boom in the development of these uses are those that have established a single management office that is responsible for analysing the proposed uses, issuing permits, and inspecting their correct application. - The role of renewable energy in promoting energy structure adjustment is continuously increasing. - The technological level of renewable energy equipment has significantly improved. - Policy support for the development of renewable energy has gradually been perfected.

Table 6. Case studies examples at international level

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4 Current Incentives Review results

Heat pumps can save 80% in energy, between 50% and 75% in operating costs and can reduce the carbon footprint by around 50%. Nevertheless, being a relatively new technology for end users, before affording any acquisition, accessing reliable background information is important to raise customer awareness and confidence that the product performance will be the optimal choice meeting user requirements and expectations.

In this sense, within the purchase decision making process, information on investment costs (acquisition and installation) plays a crucial role and very often turns out a deterrent factor due to heat pumps comparative higher upfront investments costs, therefore until market drivers place heat pumps technology in a more favourable position, economic and financial incentives are needed.

This perception has been found in nearly all the countries covered by this report. The economic and financial instruments identified, however, are not always tailored to the heat pump segment nor feature specific budget allocations thereto, being instead more or less generic and addressing “renewable heating solutions” as a whole.

This section identifies and assesses existing incentives that support and promote the use of heat pumps. Details of these incentives can be found in Annexes 13, 14, 15, 16, 17 and 18 and are grouped in two categories:

i. Incentives created by policy and legislation that increase actual HP numbers.
ii. Incentives created by policy and legislation that increase HP training / awareness.

A summary description of each one is given below:

a. Spain

In Spain, the Programme of Incentives for the Energy Rehabilitation of Buildings (PREE) helps citizens, companies, and public entities to undertake improvement actions in single-family homes, blocks of flats, buildings for administrative, educational, health and cultural use, among others. Managed by the Andalusian Energy Agency (an entity attached to the Regional Ministries of the Presidency and Finance and European Funding), the programme had a budget of €49.3 million for Andalusia, co-financed through the European Regional Development Fund (ERDF), within the framework of Spain's Pluri-regional Operational Programme 2014-2020 (POPE), and the National Energy Efficiency Fund.

This incentive can be used to completely refurbish, for example, a single-family house by supporting work on the roof, façade and windows and incorporating a photovoltaic

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installation (a measure that favours a higher incentive intensity but is not subsidised on its own) to reduce the electricity bill. A community of neighbours can also replace the lighting in the car park and install a biomass boiler for centralised heating. Another example of how the funding can be used was the funding of an educational centre to renovate its windows and air conditioning, including an aerothermal installation. For further information, see “Annex 13 – Current Incentives examples for Spain”

b. Ireland

The target of Ireland’s Climate Action Plan target is the installation of 400,000 heat pumps in the residential sector. To enable this the Government of Ireland along with SEAI is offering some incentives for energy efficiency upgrades of existing homes. Below is the brief description of grant schemes for promoting the heat pump installation in the domestic sector of Ireland.

The Heat Pump System Grant[13] offered by SEAI encourages homeowners to install heat pumps and improve the energy efficiency of their building. This grant scheme is available to all homeowners to assist them in installing a heat pump system into their home while also providing the funding through the grant scheme. It has two separate grants, the Technical Assessment grant, and Heat Pump grant. The ‘Technical Assessment Grant’ is worth €200 and can be availed of by all homeowners, including landlords, whose houses were built and occupied before 2011. The technical assessment will be conducted by an SEAI registered technical advisor who will advise homeowners of the necessary steps (measures to reduce heat loss) to make their home “heat pump ready”. Once the home is heat pump ready, then homeowners can apply for the ‘Heat Pump Grant’ which is worth €3,500.

SEAI has taken steps for further implementation of the Climate Action Plan by creating a One Stop Shop scheme (National Home Retrofit Scheme) for retrofitting Irish housing association to improve their energy efficiency. This grant is not available for individual homeowners. A list of eligible retrofit actions has been defined under this grant scheme. To avail the grant under National Home Retrofit Scheme, minimum three energy upgrade actions are required to undertake by the beneficiary.
To increase the level of renewable energy for the heating in commercial, industrial, agriculture, district heating, public sector, and other non-domestic heat user (not covered by the emission trading system) SEAI has introduced ‘Support for Renewable Heat’. The aim of this support grant is to achieve Ireland’s 2020 renewable energy targets and reducing greenhouse gas emission. These schemes will support installation and on-going operation of renewable heating system.

In the following section a review of the above stated grant schemes is presented. The review of the grant schemes is divided into different sections: - Objectives, supported

[13] https://www.seai.ie/grants/home-energy-grants/heat-pump-systems/

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actions, Technology covered, range of funding provided per project, beneficiary, target area, managing authorities and contact/website. For further information, see “Annex 14 – Current Incentives examples for Ireland”

c. Italy

31% of Italy’s electricity requirement and 44% of its thermal energy requirements are used in residential, office and commercial areas. A large part of these energy sources is intended for the air conditioning of the premises (winter heating and summer cooling).

To promote energy efficiency in buildings, various incentive tools are available:

- Tax deduction: one who carries out energy redevelopment of buildings can benefit from tax deductions, guaranteeing eco-loans granted by credit institutions to citizens for the energy requalification of buildings.

  The bonuses that support tax deductions for promoting energy efficiency in buildings are the ECOBONUS and the SUPERBONUS 110%.

- Thermal Account: a specific support scheme for small-scale interventions to produce thermal energy from renewable sources and increased energy efficiency technologies (these tools are analysed in detail in the following tables.)

- White certificates systems: even in the field of civil air conditioning it is possible to carry out interventions that allow to obtain White Certificates. They can be required in the case of installation of new heat / cold generators, accompanied or not by thermos-regulation and heat metering systems, in the context of new buildings or existing buildings.

  It is applicable to the installation of heat pumps both single and reversible type (heating / air conditioning).
  To obtain the certificates a report on the energy savings achieved must be produced, by installing a heat metering system.

All these initiatives may seem very similar to each other, but they have of course some differences. Measures, conditions, requirements change according to the incentives. And for some of these it is also possible to choose how to use them, whether directly in the tax return or whether to opt for the discount on the invoice or the transfer of credit to thirds subjects, including credit institutions and other financial intermediaries.

For example, the 110% Superbonus and the Ecobonus are very similar concessions, with the common goal of facilitating energy efficiency interventions. They differ, in addition to the rate, on the tax amortization times (for the first 5 years, for the second

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10). Additionally, the Ecobonus has fewer limiting rules. The Superbonus, on the other hand, requires the building to improve performance by two energy classes in order for applicants to be eligible.

The Thermal Account, unlike the Ecobonus and Superbonus 110%, is not a tax relief, but rather a subsidy to be requested to the GSE. The amount of the incentive depends on the power of the appliance, the climatic zone in which the house object of the intervention is located and the certified quality of the emissions of fine particles, based on which the incentive can grow from 20 to 50% compared to the basic fee. It should be borne in mind that for the Thermal Account the total amount of the incentive cannot exceed 65% of the total incentivized expenditure, but we are talking about particularly significant values which in terms of methods and speed of disbursement are in some cases more "convenient" than tax deductions. These incentives are described in detail in “Annex 15 – Current Incentives examples for Italy”

d. Upper Austria

Since the 1990s, the region of Upper Austria has been following a targeted, multi-faceted energy policy approach called "carrots, sticks and tambourines". It consists of a combination of policy measures including financial incentives ("carrots"), regulatory measures ("sticks"), and information & training activities ("tambourines") and has shown to be effective in driving the energy transition in the region.

Funding programmes ("carrots") that target the various steps of the innovation and energy transition process are strong tools. Different programmes support R&D, market introduction of new technologies and their subsequent mass deployment. Regarding the HP sector, strict efficiency criteria in funding programmes assure that only high-quality technologies are installed and that the further developments of the HP sector contribute to energy efficiency and renewable goals.

With time, regulatory building standards are tightened and the required performance level for subsidies is raised. Repeating this, step-by-step, over time has permitted to gradually raise the overall energy efficiency of the building stock while driving innovation.

The following examples represent specific incentives for supporting the energy transition in the domestic heating sector in Upper Austria using high-efficiency and renewable heating system, including heat pumps.

- Regional subsidy for HP in residential buildings (up to 3 living units)
- National subsidy "raus aus Öl und Gas" (eliminating oil and gas) in private residential buildings
- National subsidy "raus aus Öl und Gas" (eliminating oil and gas) in multi-storey residential buildings

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For further details, see “Annex 16 – Current Incentives examples for Upper Austria”

e. European Union

The European Union fosters HP technology development and adoption, either by its own or in coordination with Member States and Regions, with several support programmes, amongst which Horizon Europe, LIFE, the Just Transition Fund, the Innovation Fund and the Structural and Investment Funds. Some of the most relevant ones for regional and local action are shown in Annex 17 - Current Incentives examples for Europe wide.

f. EU and Associated Countries

Most European Countries offer a wide range of instruments for the adoption of HP, as shown by the following table *(L= loans; T: tax reduction; S=subsidy; *only at local level).*

Number	Country	Condensation heaters (natural gas, LPG, oil)	Microcogeneration	Hybrid Heat Pumps	Air/Air Heat Pumps	Air/Water or Water/Water Heat Pumps	Geothermal Heat Pumps	Biomass	Solar Thermal
1	Austria	S* L*			S	S	S	S	S
2	Belgium	ST	ST	ST	ST	ST	ST	ST	ST
3	Bulgaria	LS*	LS		LS	LS	LS	LST	LST
4	Croatia	S*		S	S	S	S	S	S
5	Cyprus	S	S		S	S	S	S	S
6	Czech Republic	S			S	S	S	S	S
7	Danimark					S	S		
8	Estonia	S			S	S	S	S	S
9	Finland								
10	France	LST		LST	LST	LST	LST	LST	LST
11	Germany	LS		LS	LS	LS	LS	LS	LS
12	Greece	LS	LS	LS	LS	LS	LS	LS	LST
13	Hungary				L	L	L		L
14	Ireland				S	S	S		S
15	Italy	ST	T	ST	ST	ST	ST	ST	ST
16	Latvia	L	L		L	L	L	L	L
17	Lithuania				S	S	S	S	
18	Luxemburg				LS	LS	LS	LS	LS
19	Malta				S	S	S		S
20	Netherland					S	S		S
21	Norway				S (by 31th dec)		S	S	S
21	Poland	ST			ST	ST	ST	ST	ST
22	Portugal	L			LS	LS	LS	LS	LS
23	Romania	S	S			S	S		S
24	Slovakia	S			S	S	S	S	S
25	Slovenia	LS	L		LS	LS	LS	LS	LS
26	Spain	S*			S	S	S	S	S
27	Sweden	T			T	T	T	T	T
28	United Kingdom	S		S	S	S	S	S	S

Figure 4. Heat pumps incentives in the EU and Associated Countries summary table[14]

[14] Source: Analysis of existing incentives in Europe for heating powered by fossil fuels and renewable sources European Environmental Bureau 2021.

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As referred to within section 3.f, out of these countries France, Germany, the Netherlands, Sweden, and Norway clearly stand out in terms of instruments variety, financial intensity, and specificity.

g. International level

Worldwide, current incentives are mainly focused on replacing obsolete equipment (boilers, furnaces, or heaters) by heat pumps through different economic and financial schemes, normally subsidies, soft loans, and tax incentives. Only a few countries feature specific financial allocations for education & training, which is essential for the advancement of heat pump technology rolling out.

As commented within section 3.g worldwide, the most relevant financial instruments are:

- Australia: Energy skills workforce training Innovation Fund
- Canada: Capital grants and subsidies, soft loans, and tax incentives to replace fossil fuel boilers with HPs, notably ground source HPs.
- China: Subsidies for households to reduce air-source HPs upfront installation and equipment costs. Complementary subsidies for ground-source HPs deployment.
- Japan: Generic subsidies, soft loans, tax incentives and R&D finance support
- New Zealand: Intensive subsidies to encourage heat pumps uptake.
- United States: Federal tax credit for new residential ground source HPs
- United Kingdom: HPs specific grants and fiscal incentives

More information is provided under Annex 18 - Current incentives at international level

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5 Interviews with Policy Makers

In addition to the legislation, policy and incentive review provided in previous sections, 5 online interviews (3 in Spain, 1 in Ireland, 1 in Italy and 1 in Belgium) were conducted with policy makers to gather information on their expectations and planned actions.

To this end, The HP4ALL consortium prepared 4 blocks of questions (see the template used in Annex 4: Template on policymaker's interviews). Details of the interviews can be found within "Annex 19 – Interviews with Policymakers". Summarized conclusions thereof are:

In **Spain**, the use of renewable energy sources and technologies for heating (including heat pumps) is overall legally and financially favoured, particularly within the Spanish Technical Building Code (CTE) and the Technical Regulation of Thermal Installations of Buildings (RITE) but without any specific earmarking nor pre-emption for heat pumps beyond the setting up of the terms for their installation and use.

As to incentives, the most important, long-standing initiative (since 2013) is the Spanish programme for sustainable energy rehabilitation measures in existing buildings, including equipment acquisition and installation, called PREE (Programa de Rehabilitación Energética de Edificios) whose budgetary appropriations, recently reinforced by Next Generation EU funds, amount to more than 400 million euro for the period 2020-2023. Again, albeit eligible, no specific allocation of funds is provided for heat pumps, which must compete with other alternatives.

Likewise, is worth mentioning a specific programme for energy rehabilitation in public buildings (PIREP – Programa de Impulso a la Rehabilitation Energetica de Edificios Publicos), a flagship initiative aimed at giving clear signals and stimulating the market from the public sector which intends to foster green and innovative public procurement for this sake, with an associated budget of 600 million euro.

Concerning workforce building energy efficiency / renewable energy systems installation and maintenance training and qualification schemes, from the public side the roll-out pathway is clearly influenced by and dependent from the EU funded Build Up Skills Initiative and its related projects (e.g., the Construye2020+ http://construye2020plus.eu/). In the private sector, despite increasing training efforts from the manufacturers associations side and growing realisation of the problem, there is a lack of coordination amongst stakeholders (manufacturers, designers, installers, end users, public authorities), with predominantly scattered and unconnected approaches.

In **Ireland**, for new buildings, existing legislation mandates compliance with NZEB requirements without mandating the deployment of heat pumps, meaning that these requirements can be met using CHP / high efficiency boilers, etc. In contrast, in the

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energy refurbishment of existing buildings NZEB applies if the space to be refurbished is more than 25%. It is hoped that the forthcoming climate action plan in Ireland will become law and really encourage the deployment of HP in the sector.

The current existing capital programmes in Ireland do not financially promote the installation of heat pumps, only covering a part of the installation (up to 25%). In terms of public procurement, Cork University has tendered for the installation of an ASHP to replace atmospheric boilers at the end of their useful life. This tender serves as an example of a pilot project for the retrofitting of heat pumps in buildings over 90 years old that have not undergone significant energy upgrades.

In **Italy**, national (mandatory) legislation strongly promotes the use of heat pumps for room air conditioning (winter and summer). In the case of new buildings or buildings undergoing energy renovation, the use of 50% of the consumption is required to be using installations powered by renewable sources. In the case of public buildings, this is increased by 10%. In addition, in Italy there is a second decree promoting the use of heat pumps where new or existing buildings must use heat pump generators to reach the minimum energy performances imposed by this decree.

In Italy there are different financing lines that promote the purchase/installation of heat pumps, these are mainly: Bono Hogar, Ecobonus and Super Ecobonus 110%. In addition, another important line is Thermal Account 2.0. In addition, in Italy there is a decree that requires technical managers, installers and maintainers of renewable energy systems to attend refresher courses.

In **Belgium** input was sought from Techlink, the professional federation connecting and representing the whole heat pump technology value chain, main conclusions being:

- Specific regional regulations apply (Brussels Capital, Flanders, Wallonia), including installation, maintenance, and RES certification. Local / regional approach is a key factor.

- Current electricity taxation system does not foster heat pump technology. Heat pumps market penetration rate is low

- Regional aid financing schemes for energy efficiency and renewable energy integration investments, including heat pumps, both for existing and new buildings do exist, but more information and communication to potential beneficiaries would be needed to encourage them to address these new approaches. No specific public procurement strategy for heat pump acquisition is provided, nevertheless green and innovative procurement initiatives are increasingly adopted.

- Some demonstration projects have been carried out in the past, which should be continued to help raise the awareness by heat pump installers.

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6 Discussion and Conclusions

This document presents a successfully tested portfolio of policy, legislation and financial tools and experience driven lessons. All of them offer broad cross-fertilization potential. Beyond the consortium countries, relevant examples have been found as well both within the EU and abroad (Australia, Canada, China, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, United Kingdom, United States).

The consortium countries (Spain, Ireland, Italy, and Upper Austria) feature an initial good set of policy mechanisms in place to address the energy transition and encourage the deployment of heat pumps in residential and non-residential buildings. In particular, the initiatives in Upper Austria and Ireland deserve further attention due to their very specific focus on HP and their interesting potential for replication and adaptation in other countries. Nevertheless, findings of this report indicate that there is still clear room for improvement and development in the heat pumps market for residential and non-residential applications.

Pilot Regional Development Plans which will run during the life of the HP4ALL project will include not only references to and reliance on existing local tools and frameworks but also suggestions for newly devised / locally adapted instruments identified elsewhere, either within the EU or abroad.

Despite country specificities in the policy, legal and market framework, common challenges and approaches have been identified, amongst which:

- Long-term government ambition for and commitment on renewable heat and energy efficiency in buildings through adequate planning, legal, technical, and administrative regulations with specific provisions / mandates for heat pump installation

- Holistic approach integrating renewable heat with energy efficiency policies and facilitating action at the local level.

- Addressing economic barriers and market failures via heat pump specific taxation, financial instruments, and support mechanisms to overcome high upfront acquisition and installation costs, particularly for vulnerable groups.

- Addressing non-economic barriers through building codes and installer certifications

- Information provision, awareness raising, and value chain networking are yet pending issues. A coordinated effort for the publication and circulation of technical

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manuals and guidance and the implementation of far-reaching information campaigns (Germany and Sweden provide success stories in this respect) is urgently needed.

- Innovation: Most governments with strong heat pump markets have long supported dedicated research and innovation programmes, particularly for combined and hybrid solutions. This has been pinpointed as a clear key success factor.

- Education & training: Despite its strategic importance only a few countries have got specific, long-lasting, support mechanisms. Reinforced education and training throughout the whole value chain, particularly for designers and installers is yet a bottleneck.

- Green and innovative procurement is yet an underexploited tool that public authorities could efficiently use to leverage public investment and trigger off market deployment, particularly in the case of provision of combined or hybrid solutions.

As reflected above, the optimal combination seems to include demand stimulation through government specific and intensive fiscal and financial incentives, increased and sustained investment in training and up-skilling throughout the value chain, and added legal and technical pressure to replace fossil fuel electricity and heat generation by renewables.

a. Spain

In Spain, the key enabling policy that support the uptake of HP systems is the enforcement of the new Technical Building Code which is more supportive to the adoption of RES based air conditioning technologies and advanced energy efficiency and saving measures, following the so-called technology neutrality principle and a problem-solving approach. Nevertheless, it is worth noting that no specific HP targets have been set here. The Code mentions the comparative advantages of such systems, but without compulsory targets.

The updating of the Building Thermal Facilities Regulation takes a similar approach and adopts a functional and problem-solving approach with clear indications of the comparative more cost-effective and sustainable performance of HP technologies, but again, without specific targets.

Both legal texts set the basis of and pave the way for the Spanish Energy Rehabilitation and Efficiency Plan, fully aligned with the European Union's Renovation Wave. It includes once again HPs as an option, but without specific targets for it.

It is important to note, due to its relevance for the implementation of the HP4ALL regional development plan, the REDEJA Initiative. This is the Andalusian government's

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common cooperation framework and network aimed at the optimization of energy efficiency, consumption, and performance of all its owned / rented buildings and facilities. REDEJA promotes, implements, and coordinates a full range of actions to improve energy efficiency in terms of energy consumption and demand reduction, RES integration and cost reduction and sustainability in energy supply contracting.

Finally, with respect to (green) procurement, it is worth noting the RIS3 and sustainability measure aligned with the Andalusian Public Procurement Strategy. These again do not have specifically mentions HP systems. This is also the case with the Spanish Public Sector Procurement Law, drawn up alongside EU Directive 24/2014 which provides for the inclusion of environmental and sustainability selection criteria and implementation conditions in public bids and contracts, but once again without specifically mentioning HPs technologies.

It can be concluded that clear shortcomings remain with respect to the legal/policy/incentive schemes discussed previously. In particular, the incentives do not require any HP specific training/qualification requirements. Regulations only refer to general qualifications required for project designers and supervisors (industrial engineers or alike) and qualified installers (thermal installation professionals), but specific HP technology related qualifications are not explicitly requested. The Spanish Construction Labour Foundation (FLC) is pushing forward with more extensive education and training schemes (including long life learning and upskilling schemes for construction unemployed workers) and framework competences recognition but for the time being this has not been reflected in subsequent policy / incentives requirements for installers.

It is therefore very difficult to discriminate between overall achievements because of the adoption of the above-mentioned measures and specific, measurable positive effects within the specific domain of HPs. The increasing adoption of such systems for use in cooling mode is out of the scope of HP4ALL project. This is unfortunately the only relevant data available, whilst clear room for improvement remains about the uptake of HP systems for heating and sanitary hot water production. Much more specific measures are required.

b. Ireland

Ireland's National Energy and Climate Plan 2019, sets target of greenhouse gas emission reduction to 30% by 2030 (from 2005 level) by non-ETS sector. Irish government have increased their reduction target from 30% to 70% and are now committed to achieve 7% annual average emission reduction from 2021 to 2030 under the program 'Our Shared Future'.

The 2009 Renewable Energy Directive requires Ireland to have 16% share of renewable energy sources by 2020 out of all the energy requirement. To achieve this

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overall target, Ireland further set a target to achieve 12% share of renewable energy in the heating sector. In 2018 Ireland achieved 6.8% share of renewable energy in the heating sector[15]. To achieve these emission reduction target Climate Action Plan sets target of installing 600k heat pumps in residential sector and 25k in commercial sector by 2030[16].

The Support Scheme for Renewable Heat (SSRH) is a government funded initiative to increase the share of renewable heating in commercial, industrial, agricultural, district heating, public sector, and other non-domestic heat users.

SSRH scheme excludes use of BioLPG from its eligibility scope, which restricts the energy efficiency investment and decision opportunities. Considering the potential of BioLPG to support the 2030 emission reduction target, it is recommended its inclusion in the SSRH and considering all practical opportunities to boost uptake of renewable and low carbon options by widening the support and make SSRH scheme more attractive to large industries.[17] [18]

To encourage the small-scale renewable heating installation, SEAI maintains a register of renewable energy installers, where homeowner who wish to install small scale renewable heating technology can contact the SEAI register renewable energy installer business. To be a registered installer, the installer needs proof of certification or training from the accredited training provider listed in SEAI website. Some of the accredited training providers needs trainees to hold Level 6 advanced craft certification in plumbing or equivalent to attend the training.

The Heat Pump System Grant[19] offered by SEAI encourages homeowners to install heat pumps and improve the energy efficiency of their building. This grant scheme is available to all homeowners to assist them in installing a heat pump system into their home while also providing the funding through the grant scheme. It has two separate grants, the Technical Assessment grant, and Heat Pump grant. The 'Technical Assessment Grant' is worth €200 and can be availed of by all homeowners, including landlords, whose houses were built and occupied before 2011. The technical assessment will be conducted by an SEAI registered technical advisor who will advise homeowners of the necessary steps (measures to reduce heat loss) to make their home, heat pump ready. Once the home is heat pump ready, then homeowners can apply for the 'Heat Pump Grant'. The main challenge for the implementation and success of the programme is lack of skilled heat pump installers. Only about 3%[20] of active plumbers in Ireland meet the SEAI criteria to install

[15] https://www.gov.ie/en/publication/0015c-irelands-national-energy-climate-plan-2021-2030/
[16] https://assets.gov.ie/25419/c97cdecddf8c49ab976e773d4e11e515.pdf
[17] https://assets.gov.ie/75987/74c9e3fb-3c7f-41c9-9ac1-e14d8c697407.pdf
[18] https://renewableenergyireland.ie/wp-content/uploads/2021/05/Renewable-Energy-Ireland_Renewable-Heat-Plan_-Final.pdf
[19] https://www.seai.ie/grants/home-energy-grants/heat-pump-systems/
[20] https://www.seai.ie/blog/opportunities-for-heat-pu/

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heat pump. Upskilling and training of the plumbers is needed to maximise the uptake of Heat Pump System Grant Scheme.

Part L of technical guidance document sets out performance compliance about 'Conservation of Fuel and Energy' which limits the energy consumption and greenhouse gas emission of buildings within a specified range. In 2019 Part L of building regulation have been updated as nZEB requirement of newly built buildings Heat pumps could play a driving role to achieve nZEB performance. As per current requirements of this regulation, achieving nZEB energy performance of building causes 0.7% to 4.2% increase in cost as compared to current construction cost. This increased cost depends on dwelling archetype and design specification.[21]

Green Tender Actions Plan is a policy for public authorities to ensure 50% of all their procurement is Green Public Procurement (GPP) during planning and implementation stage. Implementation of this policy will reduce greenhouse gas emission and increase energy efficiency within the public authorities building and country. Procurement of energy consuming equipment also falls under GPP requirement and heat pump procurement and installation could support GPP target hitting. The key barrier or risks that could impact the Green Tender procurement is general perception that green products and services are expensive to fit the annual budget constraint of individual public authorities and public bodies.

c. Italy

Over the past number of years, heat pumps in Italy have benefited from tax incentives reserved for high-efficiency systems and energy saving.

Several initiatives have been carried out in Italy to support the proliferation of heat pump technology:

- In 2008 the possibility of taking advantage of tax deductions for energy requalification and building renovation was introduced. These initiatives have been updated over the years reaching the current forms of Ecobonus and Superbonus previously analysed.
- In 2009 the RES directive focused on the promotion of the use of energy from renewable sources which officially recognizes heat pumps as one of the main renewable technologies for space heating and cooling
- In 2012 the Thermal Account appeared, the incentive to produce renewable thermal energy
- In 2014 the electricity tariff was introduced for domestic customers who used electric heat pumps as the only heating system and the consequent start of the reform of electricity tariffs. Until then, electricity tariffs were penalizing for customers who exceeded a certain limit of kWh/a and therefore disadvantaged

[21] https://www.seai.ie/publications/TGD-L-2019-Dwellings_Energy-Show-2019-Presentation.pdf

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the installation of heat pumps. A reform of electricity tariffs for domestic customers was therefore introduced. The new rate is flat and does not change according to consumption.

The research indicated that tax incentives and new electricity tariffs make this technology much more attractive economically as well as from a technology and environmental point of view. End users are starting to learn and appreciate the energy, economic and environmental benefits of this technology.

This means that heat pumps have been recognized as a strategic technology in the energy upgrading of buildings and for this reason they are incentivized, alternatively, through the Ecobonus or the Superbonus for the tax deduction of expenses incurred for interventions to replace existing winter air conditioning systems with systems equipped with heat pumps and the Thermal Account for small-scale interventions for the production of thermal energy from renewable sources and for the increase in energy efficiency.

Based on the available data in 2017, it is estimated that 900,000 homes use heat pumps as their main heating system with an average capacity of 10 kW, an overall stock of approximately 9 GW is estimated. On the other hand, a stock of heat pumps of 24 GW is estimated to be used as the main heating system in the buildings of the tertiary sector[22].

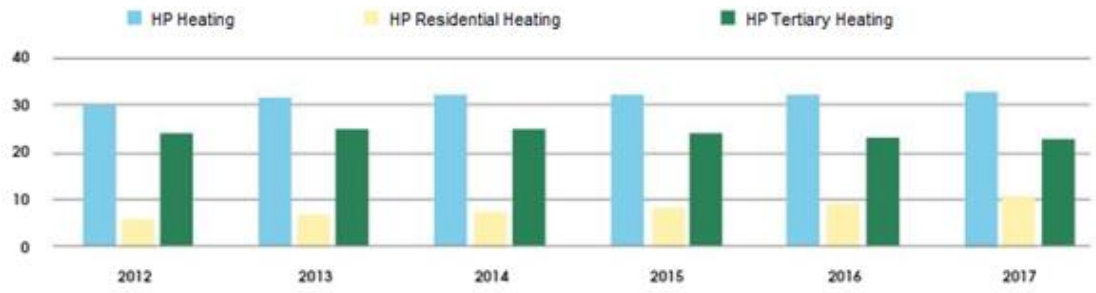

Figure 1. Residential and Tertiary HPs Heating

The role of heat pumps in the air conditioning of buildings for the achievement of the new EU decarbonisation objectives for the next decade has been officially formalized by the Integrated National Energy and Climate Plan. According to the plan, the development objectives of heat pump production can be achieved by acting on civil consumptions (residential and tertiary) through an energy requalification strategy for existing buildings. The overall growth in installed capacity of heat pumps to achieve

[22] Libro Bianco sulle Pompe di Calore -2020 – Assoclima; Anima

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the role assigned to this technology must go from 33 GW in 2017 to 65 GW in 2030, with a greater increase in the residential sector than in the tertiary sector[23]

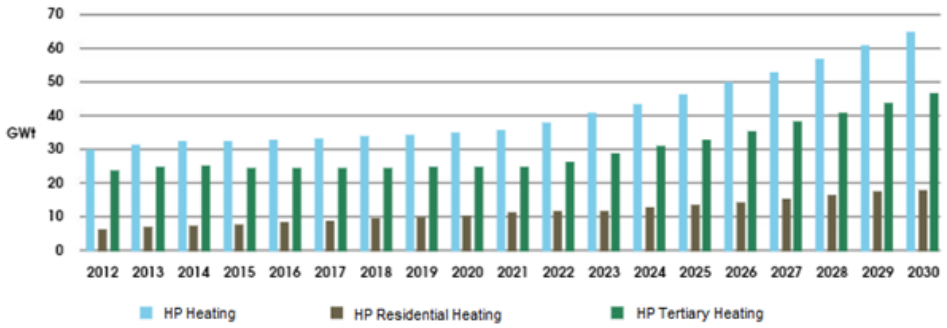

Figure 2. HP Heating evolution to reach the EU targets

This measures have been successful however to improve the effectiveness of these measures the mechanisms of tax deductions need to be made structural, financially strengthen incentives, indicate more clearly and effectively the types of interventions incentivized with eco-bonuses and continue the process of simplification in the procedures for accessing the Thermal Account which, together with greater information on the technology to the interested public.

Training Framework

The Directive 2009/28 EC of the European Parliament introduced the obligation of professional qualification for installers and maintainers of systems powered by RES. In 2016 the revision of the Guidelines of the Regions and Autonomous Provinces was published, which govern the training courses aimed at obtaining the professional qualification certificate of "Installer and extraordinary maintenance technician of energy technologies powered by renewable sources".

The research established that attitudes towards training were critical. In Italy there are many tens of thousands of thermo-hydraulic installation companies, of which a large number is made up of individual firms that are less inclined to pursue innovative technology and install heat pump systems, compared to consolidated traditional solutions. The training obligations imposed at the legislative level are not seen as an opportunity for growth but as a further imposition and cost in terms of training costs, employee time and productivity and therefore something to be avoided. Consequently, it is important to develop tools, even if only for information and support, which allow installation companies to access the existing funded training which could reducing training costs.

[23] Libro Bianco sulle Pompe di Calore -2020 – Assoclima; Anima

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Awareness Raising

As often mentioned, another important aspect is the need to develop campaigns and information tools for the end users to raise the awareness on the advantages of the technology. An institutional communication campaign on heat pumps aimed at citizens is needed.

d. Upper Austria

In Upper Austria, the development of the HP market is supported through a well-established, multi-faceted energy policy approach called "carrots, sticks and tambourines". The "carrots" are financial incentives, such as funding programmes that target the various steps of the innovation and energy transition process. Stringent eligibility criteria regarding system efficiency and noise emission ensure that only high-quality technologies are installed and that the further developments of the HP sector contribute to energy efficiency and renewable goals. The "sticks", regulatory measures, include building standards. These are tightened over time, contributing to gradually raising the overall energy efficiency of the building stock while driving innovation. "Tambourines" refers to the comprehensive information, advice and training services offered by the ESV and that support all actors along the value chain in investment decision-making and project implementation.

The regional government's decarbonisation target (which includes eliminating oil heating) is also a key driver for the HP market. The policy framework that is put in place to achieve these goals supports the development and implementation of high efficiency and renewable solutions – including heat pumps.

Overall, this has contributed to developing the heat pump market for small, residential applications in Upper Austria. This market is already quite well developed (especially in new builds). Since Upper Austria is an industrial region, there is interesting opportunity in supporting the market development of large-scale applications in the service sector and industry. At this stage, current challenges include low levels of awareness of promising application possibilities among planners and users, and the lack of required skills by planners and installers. Also, as with other energy transition technologies, investment costs present a challenge (especially compared to gas).

This is being considered in the region's policy measures, supported by the regional energy agency (ESV). The "carrots, sticks and tambourines" will certainly show to be effective in helping get the market for large-scale applications going. Among others, a stronger roll-out of targeted information, exchange, and further training along the entire value chain (from professionals to end-users) will contribute to increasing awareness, generating end-user trust, creating both market push and demand and ensuring high-quality planning and implementation of projects.

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e. Europe wide

Using data extracted for the EHPA 2020 Market Report (covering 21 European countries), in 2019, heat pumps with a thermal capacity of 12.7 GW were installed producing approx. 25.1 TWh of useful energy and integrating 15.6 TWh of renewables in heating and cooling while avoiding 4.0 Mt of CO2-equivalent emissions. To produce the 2019 sales volume and to maintain the installed stock, it is estimated that a total of 78,969 man-years of employment were necessary. Obviously real employment related to the heat pump market is larger, as not all employees work full-time on heat pumps only.

In aggregated terms, nearly 13.27 million heat pump units were installed since 1996. This amounts to an installed thermal capacity of 114.7 GW. Installed heat pumps have been estimated to produce 226.0 TWh of useful energy, 143.8 TWh of which being renewable.

Their use produced estimated savings of 183.6 TWh of final and 84.1 TWh of primary energy. Figure (RES from stock) shows the split of renewable energy production from heat pumps on a country level. France is the country that produces the most renewable energy from heat pumps, followed by Sweden, Germany, and Italy.

In the graphic below, France is leading the way in HP adoption (in terms of countries that the EHPA report is covering). There are a set of circumstances that make France stand out:

1. An uncertainty in energy prices in the early 2000's, made installing an efficient HP, as a way to mitigate against this uncertainty.
2. In the mid 2000's, a series of public incentives, coupled with rising fossil fuel prices (making electricity more appealing), contributed to very favourable market conditions.
3. In the early 2010's, new building regulations, focusing on energy efficiency, support the way for HPs as the most suitable solution.

It should be noted that not all types of HPs installations are growing (e.g., geothermal HPs) and that, the number of installations has also produced the demand and supply of a highly skilled HP value chain.

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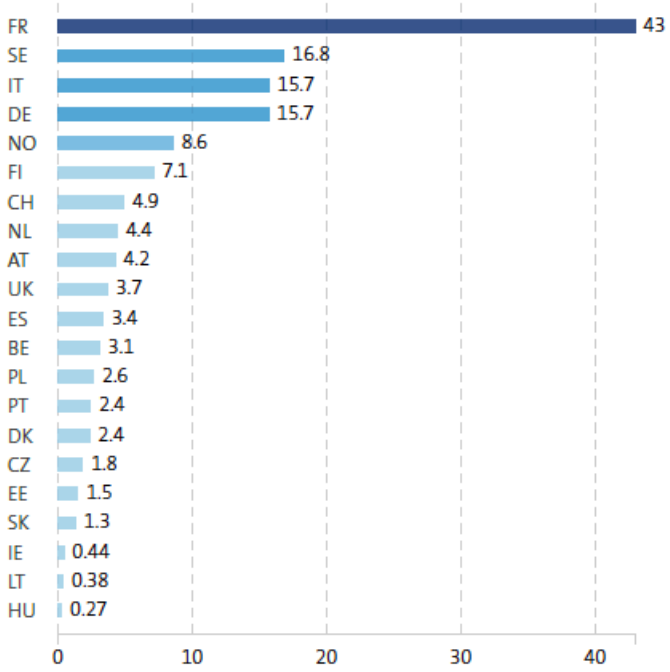

Figure 3. RES from stock in Europe

f. Interviews with stakeholders

Analysis of the interviews with the stakeholder indicated that both in Spain, Ireland, and Belgium that there was a perception that there were no specific regulations that promote the use of heat pumps, rather it is for their regulation and use. On the other hand, in Italy, if there is a clear and specific regulation that allows the purchase / use of heat pumps for new buildings and for buildings that are going to undergo energy renovation.

Both in Spain, Ireland and Belgium the current financing programs do not specifically promote the installation or purchase of heat pumps, they are more focused on the training of responsible persons. However, many of these are not well defined or available to everyone since some require a lot of bureaucratic procedures as in the case of Belgium, others only finance a small part as in the case of Spain and Ireland. On the contrary, in Italy there are different well-defined and clear lines of financing available to everyone.

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Annex 1: Template on policies

Name		**Type**	
Date of establishment			
Targeted			
Brief Description			
Briefly describe the policy: What is its approach? What stakeholders is targeted? What activities carry out? What do the policy do/offer?			
Objectives			
What do the policy achieve?			
Outcome			
What do the policy achieve?			
Key learning points/comments			
What can we learn from this policy?			
Relevance to HP4ALL			
How can we apply these learning points to HP4ALL?			

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Annex 2: Template on legislations

Name		**Type**	
Date of establishment			
Targeted			
Brief Description			
Briefly describe the policy: What is its approach? What stakeholders is targeted? What activities carry out? What do the policy do/offer?			
Objectives			
What do the policy achieve?			
Outcome			
What do the policy achieve?			
Key learning points/comments			
What can we learn from this policy?			
Relevance to HP4ALL			
How can we apply these learning points to HP4ALL?			

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Annex 3: Template on current incentives

Programme		**Type**	☐ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			
Objectives			
Supported actions			
Technologies covered			
☐ Geothermal ☐ Solar thermal ☐ Biomass ☐ District heating and cooling ☐ Heat pump ☐ Thermal energy storage ☐ Cogeneration ☐ Integrated solutions ☐ Other:			
Cofinancing and interested rate			
Range of funding per project			
Beneficiaries			
☐ University ☐ Research centre ☐ Public authorities ☐ Start-up ☐ SME ☐ Mid-cap company ☐ Large company ☐ NGO ☐ Other:			
Target area			
☐ European Union ☐ MSs			

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☐ MSs' region/s
☐ Other:

Resources
Managing authority
Contact/website

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Annex 4: Template on Policymakers review

Entity Name		**Location**	*(Country/Region)*
Type			
Website			
Q1: Which national or local regulations are particularly relevant/most effective to promote the installation of HPs in your country? Are there any other regulations that are particularly relevant as a success story or good practice to promote the installation of heat pumps? If so, why?			
Q2: What current or planned lines of financing from your organisation can cover the purchase/installation of heat pumps? Under what financing conditions? Are there any restrictions or premiums regarding the type of equipment? Do you know of any other programme or initiative that you consider important to mention as a success story or good practice to promote the installation of heat pumps in relation to the abovementioned?			
Q3: Do you have any line of support for the training / capacity building of installation and maintenance technicians or construction workers in relation to the installation and maintenance of heat pumps or other air conditioning and/or water/electricity/gas supply equipment? Has it been useful for the sector? Can you indicate strengths and weaknesses?			
Q4: In terms of public procurement, can you tell us if your organisation or others you know of have carried out tenders for the purchase of heat pumps or more generally for the improvement of the energy efficiency of your facilities? Could you describe it very briefly? Could you cite any tender in the above case that could fall under the concept of green public procurement?			

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Annex 5 - Legislation – Case studies examples for Europe wide

Name	Energy Performance of Buildings Directive (EPBD)	**Type**	EU Directive
Date of establishment	Amended in 2018		
Targeted	The building sector		
Brief Description			
The purpose of the EPBD is to accelerate the cost-effective renovation of buildings that already exist. One of the ways to improve energy efficiency is by reforming the building sector, which is the largest single energy consumer in Europe, due to 75% of buildings being energy inefficient. As part of the Renovation wave, this will be reviewed by the Commission, and a legislative proposal is expected at the end of 2021.			
Objectives			
Alongside the Energy Efficiency Directive, the EPBD hopes to: - Achieve a highly energy efficient and decarbonized building stock by 2050 - Create a stable environment for investment decisions - Enable consumers and businesses to make more informed choices to save energy and money			
Outcome			
Investments in energy efficiency will stimulate the economy, especially in the construction sector, which accounts for 18 million direct jobs in the EU. SMEs will benefit. As the contribute more that 70% of the value-added in the EU's building sector In addition, renovation of existing buildings could reduce the EU's total energy consumption by 5-6% and lower CO2 emissions by around 5%.[24]			
Key learning points/comments			
The building industry is going to be increasingly important in the EU's ambition in the renovation of energy inefficient buildings and so the demand for workers with relevant skills will only increase.			
Relevance to HP4ALL			
HP4ALL's tools all could contribute towards the goals of the EPBD. Heat Pumps contribute to increasing the energy efficiency of buildings and they can be used in renovation, and so encouraging this means that there is a need for such skills, which is the ambition of HP4ALL.			

Name	Renovation wave	**Type**	Commission Strategy
Date of establishment	14th October 2020		

[24] European Commission 'Energy Performance of Buildings Directive', https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en (Last accessed 31 March 2021).

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Targeted	The building sector, including both public and private buildings.

Brief Description

The Renovation wave is a new strategy which aims at increasing the renovation rates in both public and private buildings. These renovations should improve the lives of those living in the buildings, reduce European greenhouse gas emissions, and create up to 160,000 green jobs in the construction sector. This policy also aims to address energy poverty, with the 'Commission recommendation on energy poverty' published alongside the renovation wave. The Renovation wave will build on measures seen in the 'Clean Energy for All Europeans' package, requiring Member States to publish a Long-Term Building Renovation Strategy (LTRS), and amends aspects of the Directive for Energy Performance in buildings ((EU) 2018/844) alongside aspects of national energy and climate plans (NECP). It is also linked to the New European Bauhaus through sustainable design.

The Commission plans to break down barriers to renovation with policy instruments, funding, and technical assistance, such as an increased capacity for public authorities and training for workers, and market development for sustainable construction products.

Objectives

- To renovate 35 million inefficient buildings by 2030
- To double the current renovation rate

Outcome

Expected outcomes:

- *Creating 160,000 green jobs in the construction sector by 2030*
- *Reduce emissions and energy use*
- *Combat energy poverty*
- *Improve quality of life for residents*
- *Create decarbonised, digitalised, and smarter homes*
- *Respond to energy poverty.*[25]

Key learning points/comments

Renovation of buildings is key to addressing the EU's energy usage and will become increasingly important in the coming years. It is also essential that we ensure that workers have the correct skills to meet targets set by the Commission. Many green jobs will be created, and it is important that workers are correctly trained to be able to respond to this call.

Relevance to HP4ALL

Due to EU climate ambition, there is going to be an increase in the availability of green jobs, and so the workforce needs to be highly skilled to be able to meet this demand and enable high quality solutions.

[25] European Commission 'Renovation Wave', https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en (Last accessed 31 March 2021).

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Annex 6 - Legislation – Case studies examples at international level

1. USA

Name	Geothermal Energy Act	**Type**	
Date of establishment	2015		
Targeted	Building owners		
Brief Description			
The United States of America, through the Geothermal Resources Council, the Geothermal Exchange Organization and the Geothermal Energy Association, drafted legislation for the use of geothermal resources in the different states to achieve the goals set out in the Clean Power Plan published by the Federal Government.			
Objectives			
Several regulations related to heat pumps for environmental protection were established to achieve an efficient and renewable heating and cooling technology that can be developed in all 50 States. To this end, government agencies were encouraged to consider their use as a method of achieving energy saving targets.			
Outcome			
This law amends the Renewable Energy Portfolio Standards to recognise renewable thermal energy produced by heat pumps, and to create programmes to measure and calculate the aggregate of this renewable energy for all commercial and residential installations. It also enables local authorities to reduce energy demand and its importance in reducing carbon emissions.			
Key learning points/comments			
There are two main points: • In most states there is no specific legislation on geothermal energy. In many cases, geothermal energy is regulated in general laws related to renewable energy. • Taking into consideration the shallowness of geothermal resources that are intended for direct uses, the states have resolved that local governments - state or municipal - should issue the rules to be applied for the regulation of these uses.			
Relevance to HP4ALL			
Due to EU climate ambition, there is going to be a high awareness of the use of renewable energies.			

2. Japan

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Name	Green Purchasing	**Type**	Procurement
Date of establishment	• 1989 Eco Mark Program was launched • 1996 Green Purchasing Network was established • 2001 The Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and other Entities (Act on Promoting Green Purchasing) was put in force • 2007 The Law concerning the Promotion of Contracts Considering Reduction of Greenhouse Gases and other Emissions by the State and Other Entities (Green Contract Law) was put in force • 2015 Basic Policy on Promoting Green Purchasing		
Targeted	Purchasers: • Mandatory: Government agencies and public institutions • Encouraged: Local governments • Voluntary: Businesses and citizens Certification bodies/ Labelling organizations e.g., Eco Mark Program Suppliers NPOs/NGOs e.g., GPN (Green Purchasing Network)		
Brief Description			
The Act on Promoting Green Purchasing guides the central government to implement Green Public Procurement (GPP) by identifying designated procurement items with their evaluation criteria, whereas the Eco Mark Program, which is implemented by the Japan Environment Association, guides suppliers and consumers to implement green purchasing by setting the certification criteria in a different position from the government.			
Objectives			
The Act sets the level of the evaluation criteria in consideration for the environment and the volume of GPP and to establish a society that can develop sustainably with reduced environmental loads, by providing for necessary matters and for promoting a shift of demand to eco-friendly goods, etc., including the promotion of the procurement of eco-friendly goods, etc. by the State, incorporated administrative agencies, etc., local governments, and local incorporated administrative agencies, and the provision of information concerning eco-friendly			

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goods, etc., thereby contributing to ensuring healthy and cultured living of both the present and future generations of the citizens[26].

Outcome

The policy is based on prior legislative initiative and follows the international framework for green and sustainable public procurement. It has a holistic view of the market actors (demand and supply) and encourages as well as assigns the resources to pursue green purchasing (including in heat pumps). Training resources are available as part of the Ministry (Ministry of the Environment) and relevant governmental Agencies collaboration with the Green Purchasing Network (NGO). The legislation considers already existing resources and utilise them in conjunction (e.g., the Eco Mark Programme). The outcome would be represented by a shift in the value chain to more sustainable products and resources.

Key learning points/comments

The policy is useful as it can be easily adapted and replicated in other countries, indeed it is based on the international framework for such types of actions. The key takeaway is that green procurement involves all actors along the value chain, but it is the public stakeholders that must design the suitable legislation and assign the relevant resources as to incentivise the private sector to follow. Additionally, a holistic approach that considers the complementary instruments that are already running or are being designed, avoids replication and complexity, while private non-profit stakeholders and governmental Agencies can be tasked with promoting the initiative.

Relevance to HP4ALL

Governmental technological, product and process incentives that involve the entire value chain, are complemented by other relevant instruments, and are widely disseminated, while involving a shift in renewable heating and cooling as well as energy generation and the up-skilling / re-skilling of professionals as to reflect the growing demand that the respective procurement process and characteristics entail, are all of relevance to the projects.

[26] Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Act No. 100 of May 31, 2000), Article 1
https://www.env.go.jp/policy/hozen/green/kokusai_platform/2015report/handbook_eng.pdf

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Annex 7 - Policy – Case studies examples for Spain

Name	Spanish Technical Building Code	**Type**	Regulation and best practices promotion
Date of establishment			
Targeted	Installers, building owners, homeowners.		

Brief Description

In Spain, the policy related key factor for the deployment of heat pump technologies is the updating of the Spanish Technical Building Code, much more open, favourable, and problem solving oriented in its new drafting for the adoption of RES based air conditioning technologies and advanced measures of efficiency and energy saving.

Objectives

The Technical Building Code specifically includes a Basic Document (DB-HE Energy Saving) with detailed instructions, procedures, and requirements on the subject. DB-HE lays down precise indicators that if met automatically ensure full compliance with the established set of requirements, namely:

HE 0: Zonal and functional limitation of energy consumption.

Building energy consumption shall be limited according to their climatic zoning and use. Energy consumption will be largely met through RES.

HE 1: Conditions for energy demand control

Buildings shall have a thermal envelope restricting as far as possible their primary energy needs according to their climatic zoning and use. Significant reductions in the thermal performance or lifespan of the thermal envelope, such as condensations, shall be limited.

HE 2: Conditions of thermal installations
Addressed in the current Regulation on Thermal Installations in Buildings (RITE). Its application will be defined at building project level.

HE 4: Minimum contribution of renewable energy to meet demand for sanitary hot water

Buildings will meet their sanitary hot water and indoor pool air conditioning needs by largely using RES or renewable cogeneration processes; either generated in the building itself or through connection to an urban heating system.

HE 5: Minimum renewable power generation

In buildings with high electricity consumption, electricity generation systems from renewable sources for own use or supply to the grid shall be incorporated.

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Outcome
Compulsory Technical Specifications indirectly prescribing more efficient, RES based heating, cooling and SHW supply systems, citing (but not requiring) HPs as an option
Key learning points/comments
It is a step forward regarding previous regulations on the subject
Relevance to HP4ALL
The Technical Building Code paves the way for a more practical and advantageous, compared performance approach that should place HP technology in a favourable position in the decision-making process by building owners and installers when forced to decide upon optimal choices in thermal equipment installation and performance.

Name	New Building Thermal Installations Regulation (RITE)	**Type**	Regulation and best practices promotion
Date of establishment	21st March 2021		
Targeted	Installers, building owners, homeowners.		

Brief Description

RITE imposes tough justifications and restrictions for the installation of conventional thermal systems instead of more efficient and sustainable ones -e.g., geothermal HPs & underfloor heating or solar thermal energy hybridization with natural gas boilers- so that the former must be motivated by a sound energy efficiency comparison between the opted solution and alternative one, notably those more technically, environmentally, and economically advanced. In addition, RITE requires that old time built, high-consumption buildings take first steps to become smarter and contribute to GHG emissions reduction.

RITE follows a performance objective led approach for thermal installations in buildings, in accordance with the principle of *technological neutrality*, without prescribing the usage of a particular technique or material, thereby enhancing the uptake of emerging technologies and solutions (innovation procurement).

In addition, RITE incorporates to a different extent key provisions from EU Regulations:

- Directive (EU) 2018/2001 RES integration in the heating and cooling sector
- Directive (EU) 2018/844 and Directive (EU) 2018/2002 on energy efficiency in buildings, with several amendments within the technical instructions for the installation of thermal systems in buildings, which must be designed under optimised energy efficiency performance, (waste) energy recovery and RES integration.
- EU Regulations on eco-design and labelling of energy-related products.

From an operational point of view RITE brings about as well some significant changes in best practices adoption:

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- Practitioners and technicians in charge of building reforms and refurbishments must propose high-efficiency alternative installations and replacement of fossil fuelled equipment with RES based alternatives. In addition, energy efficiency of all technical installations of buildings should be assessed when they are going to be installed, replaced, or improved.
- Tertiary use buildings with floor area more than 1,000 square meters must advertise their energy consumption pattern, register and sourcing. In addition, those facing high energy consumption rates with nominal output of more than 290 kW must install digital control systems to become smarter.
- Thermal installations inspections procedures are also amended so that heating systems, air conditioning systems, combined air conditioning and ventilation facilities and combined heating, ventilation, and sanitary hot water installations with nominal output above 70 kilowatts (kW) will be inspected periodically.

Objectives

RITE update will help achieve the goal of improving energy efficiency by reducing primary energy consumption by 39.5% by 2030.

Outcome

RITE brings in tougher functional requirements for thermal installations in order to contribute to energy efficiency measures Included in the Spanish National Integrated Energy and Climate Plan (PNIEC) 2021-2030 as well as the National Air Pollution Control Programme, which will contribute to the objectives set forth by the energy efficiency and national air pollutants emission ceilings Directives.

Key learning points/comments

RITE follows a performance objective led approach for thermal installations in buildings, in accordance with the principle of *technological neutrality*, without prescribing the usage of a particular technique or material, thereby enhancing the uptake of emerging technologies and solutions (innovation procurement). Also, RITE imposes tough justifications and restrictions for the installation of conventional thermal systems instead of more efficient and sustainable ones -e.g., geothermal HPs & underfloor heating or solar thermal energy hybridization with natural gas boilers- so that the former must be motivated by a sound energy efficiency comparison between the opted solution and alternative one, notably those more technically, environmentally, and economically advanced. In addition, RITE requires that old time built, high-consumption buildings take first steps to become smarter and contribute to GHG emissions reduction.

Relevance to HP4ALL

RITE paves the way for a more practical and advantageous, compared performance approach that should place HP technology in a favourable position in the decision-making process by building owners and installers when forced to decide upon optimal choices in thermal equipment installation and performance.

Name	REDEJA	**Type**	Organizational measure
Date of establishment	2007		
Targeted			

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	Public Authorities, Public building owners

Brief Description

REDEJA is the Andalusian Government common cooperation framework and network aimed at the optimization of energy efficiency, consumption, and performance of all its owned / rented buildings and facilities. Along this way, REDEJA promotes, implements, and coordinates a full range of actions to improve energy efficiency in terms of energy consumption and demand reduction, RES integration and cost reduction and sustainability in energy supply contracting.

Through REDEJA, the Andalusian Regional government intends to:

- Plan on, invest in, manage, and maintain in an integrated and centralized way the whole stock of public owned or rented energy supply infrastructures and facilities

- Centralize and manage collectively as many as possible energy supply and service contracts of the public sector domain, to gain vast economies of scale and allow for a more strategic, efficient, and effective green procurement approach.

The portfolio of REDEJA actions specifically include:

a) Promotion of centralized energy supply and services public tenders and setting up general guidelines and technical specifications of energy contracts within this frame

b) Procurement and aftersales related centralized dialogue with energy supply companies, equipment providers and ESCOs to streamline the whole process.

c) Energy studies audits implementation to assess the feasibility of energy-saving measures and RES integration in the public owned / rented building stock in Andalusia

d) Andalusian public owned / rented building stock energy supply facilities monitoring

e) Education, training, and advice to enable the adoption and implementation of upcoming and in force energy regulations.

Objectives

The Energy Planning model promoted by the Andalusian Regional Government stipulates those public administrations must assume a catalyst and exemplary role aimed at achieving greater sustainability in energy supply and consumption.

In this sense, a centralized management of energy investments and contracting and management procedures is set to deliver huge energy and economic savings throughout the whole Andalusian public owned /rented stock, in some cases above 40%. REDEJA stems from this as a new way of understanding and managing energy demand

REDEJA pursues a significant energy efficiency improvement and a large-scale RES integration throughout the whole owned / rented real estate stock (buildings and facilities) of the Andalusian Regional Government.

Outcome

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The optimization of energy supply contracts and unified management of energy services, enables larger economies of scale and efficiency.

Studies and energy audits allow to identify energy savings and efficiency measures and the possibility of implementing RES integration.

Centralized investments in advanced equipment and infrastructure pave the way to rolling out large scale green / innovation procurement schemes.

Education, training, and advice facilitates a wider ranging adoption of more efficient public procurement, management, and legal compliance procedures throughout the whole life cycle of energy demand and supply in order to achieve the highest possible energy rating standards in public owned / rented buildings.

Key learning points/comments

The importance of a centralized approach to allow for economies of scale and large-scale adoption of best practices

The effectiveness of a multifaceted, packaged combination of economic, legal, and administrative measures
The key role as early adopter / launching customer / gatekeeper of public administrations

Relevance to HP4ALL

By having in mind this approach, WP5 regional development plans and WP6 replication Plans can be more easily defined and deployed.

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Annex 8 - Policy – Case studies examples for Ireland

Name	Housing Retrofit Taskforce	**Type**	Publication
Date of establishment	22 May 2020		
Targeted	Ensure achievement of Climate Action Plan targets in decarbonization of housing stock through designing and developing national retrofit programs which provides attractive financing products to persuade people to renovate.		
Brief Description			
In September 2019 the Minister of Communications, Climate Actions and Environment established a cross-departmental and multiagency housing retrofit taskforce. The task force is being led by Secretary General of Department of the Environment, Climate and Communications (DECC). The taskforce will develop the national retrofit delivery model to achieve Climate Action Plan targets in decarbonization of housing stock. To improve the cost-effectiveness of housing retrofits, this model will create groups of home retrofits in the same area, create easy payback mechanism and find smart financing. The taskforce has defined 4 pillar objectives that will form the core of retrofit solutions through various innovative approaches. These 4 pillars are, (1) Improve homeowner awareness to increase the demand, (2) Provide easy and high payback to homeowners along with smart funding mechanism, (3) Supplier scale-up and contracting and (4) Programme governance and roadmap.			
Objectives			
To administer the design and development of national retrofitting program of Ireland under Climate Action Plan, which has an objective of retrofitting at least 500,000 houses and the installation of 400,000 residential heat pumps by 2030.			
Outcome			
The proposed outcome of this policy will be to implement a model/programme to deliver 500,000 BER B2/cost optimal or carbon equivalent retrofits and 600,000 heat pump installations by 2030.			
Key learning points/comments			
The taskforce will identify and provide recommendations to government with the best suitable implementation model, body/organisation for managing, best suitable financing and funding approaches for the roll-out new programmes at local level. The taskforce will also identify the programme rollout approach to maximise the participation of lower income group along with monitoring and evaluation method of the suggested programmes.			
Relevance to HP4ALL			
One of the key objectives of the taskforce is to promote heat pump installation in Irish homes. The taskforce will benefit by the research outcomes and tools created by the HP4All project for the design and development of heat pump installation strategy for the national retrofit			

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programme. The project can also provide insight and training requirements to support the growth of heat pump market.

Name	Green Tenders	**Type**	An action plan on green public procurement
Date of establishment	25/02/2021		
Targeted	Implement Green public procurement within public authorities.		
Brief Description			
Green Tenders is an action plan to promote green procurement within public authorities and assist them in Green Public Procurement (GPP) from planning to implementation by highlighting existing best-practice. GPP means incorporating green criteria in procurement contracts. 10-12% of Ireland's GDP is contributed by public sector procurements each year (€14 billion in 2011). Hence, the public sector has responsibility and potential to stimulate the market towards becoming resource efficient and energy efficient. Based on EU practice criteria, Green Tenders prioritises eight service/product groups to promote: construction, Transport, Energy, Food and Catering Service, Cleaning products and services, Paper, Uniforms and other textiles, and ICT.			
Objectives			
The main objectives of this program include promoting health, reduce energy consumption and associated costs, reduce CO2 and other greenhouse gas emissions, protect, and enhance biodiversity etc. Another objective is to contribute towards a green economy, and to make Ireland a major contributor to Europe's green economy.			
Outcome			
In line with the EU policy objectives, Green Tender also sets a target of awarding 50% GPP in terms of procurement numbers and procurement value of total contracts concluded.			
Key learning points/comments			
The key barrier or risks that could impact the Green Tender procurement is general perception that green products and services are expensive to fit the annual budget constraint of individual public authorities and public bodies.			
Relevance to HP4ALL			
The energy sector has been designated as one of the priority sectors by Green Tenders. The key objective of Green Tender for the energy sector is energy efficient procurement ranging from energy using products, energy service and capital projects. Procuring heat pumps will play a crucial role in these procurements. Research results of the HP4All project will be helpful to further plan and shape the Green Tender action plan for the energy sector.			

Annex 9 - Policy – Case studies examples for Italy

Name	Relaunch Decree n. 34 (Superbonus 110%)	**Type**	Decree

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Date of establishment	19 May 2020
Targeted	Private entities/ citizens

Brief Description

A 110% tax deduction for maintenance and energy redevelopment works incurred from 1st July 2020 until 31st December 2021. The tax deduction is recovered in 5 years starting from the year of execution of the work. For example, for an expense of 10,000 euros, a tax deduction of 11,000 euros is obtained, equal to 2,200 euros per year, to be recovered in the next 5 years.

The Superbonus applies to interventions carried out by:

- Condominiums
- Natural persons, outside the exercise of business activities, arts, and professions, who own or hold the property object of the intervention
- Autonomous public housing institutes or other bodies that meet the requirements of the European legislation of "in house providing".
- Housing cooperatives
- Onlus,
- Voluntary associations and social promotion associations
- Sports associations and clubs

Objectives

The initiative aims at encouraging energy renovation processes aimed at achieving higher Energy Performance Certifications through the 110% deduction of the costs incurred for interventions that improve the energy efficiency of buildings and reduce the seismic risk.

Outcome

The deduction can be requested if any of the following interventions are implemented:

- Thermal insulation interventions
- Condominium interventions for the replacement of existing winter air conditioning systems
- Interventions on single buildings
- Energy requalification works
- Installation of infrastructure for charging electric vehicles in buildings
- Installation of photovoltaic systems connected to the electricity grid and integrated storage systems
- Anti-seismic interventions
- Centralized systems for heating, cooling, or hot water supply
- Heat pump and condensing systems
- Hybrid or geothermal systems combined with photovoltaic systems

This initiative encourages and make possible actions for the energy efficiency improvement also for citizens who are economically weaker and therefore discouraged to face these interventions.

Key learning points/comments

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This initiative is a great opportunity to invest in requalification actions and in the energy transition and to shorten the economic barriers of citizens who can be encouraged in actions to improve the energy efficiency of their building that would normally not be attractive.

The initiative also allowed to increase knowledge on energy efficiency since citizens can personally achieve a benefit and are therefore more interested in investigating the issue and finding out what they can achieve through these measures.
Citizens can personally take advantage of the final benefit as the renovation is implemented in their own building / home / condominium.

Relevance to HP4ALL

The installation of heat pumps and hybrid systems is rightfully included in the 110% Superbonus.

The directive allows citizens to improve their building energy performance, stimulating a positive response even from subjects who would not normally be interested because the technology is considered too expensive or not clear.

However, the request to benefit from these incentives is not so simple and immediate. A simplification of the procedures is needed, as well as a greater information on the tool to the interested public that could increase its effectiveness.

Name	Thermal account	**Type**	Ministerial Decree
Date of establishment	28th December 2012		
Targeted	Public administrations and private entities		

Brief Description

The Ministerial Decree of 28 December 2012 implemented the so-called "Thermal Account", a specific support scheme for small-scale interventions to produce thermal energy from renewable sources and increased energy efficiency.

The following subjects can benefit from the incentives
a) public administrations.
b) private entities as natural persons, condominiums, and business owners.

For the purposes of accessing incentives, subjects can use the instrument of financing through third parties or an energy performance contract or an energy service, also through the intervention of ESCOs.

After the first years of "operation" of the Thermal Account, it was decided to review it and facilitate its use. For this reason, today, we are talking about the Thermal Account 2.0, an evolution of the original incentive. The interventions that allow access do not change, but the procedure for requesting the incentive has been simplified.

Objectives

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When it is chosen to carry out an energy efficiency intervention, the first step is to calculate the benefits by considering how much savings it ensures and, consequently, how long the investment takes. Arranging an incentive for these interventions allows those who benefit from them to return the investment even faster and therefore encourage its spread.

Outcome

Among the small-scale interventions to produce thermal energy from renewable sources and high-efficiency systems recognized by the decree we find the replacement of existing winter air conditioning systems with winter air conditioning systems equipped with heat pumps, electric or gas, using aerothermal, geothermal, or hydrothermal energy.

Key learning points/comments

A great opportunity to invest in requalification and in the energy transition and to shorten the economic barriers of citizens who can be encouraged in actions to improve the energy efficiency of their building that would normally not be attractive.

Relevance to HP4ALL

The installation of heat pumps and hybrid systems is rightfully included in the decree incentives.

The directive allows citizens to improve their building energy performance, stimulating a positive response even from subjects who would not normally be interested because the technology is considered too expensive or not clear.

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Annex 10 - Policy – Case studies examples for Upper Austria

Name	Energy advice service of the ESV	**Type**	Information and advice service
Date of establishment	1991		
Targeted stakeholders	Households, companies, and public administrations		

Brief Description

Briefly describe the policy: What is its approach? What stakeholders is targeted? What activities carry out? What do the policy do/offer?

The Regional Energy Agency of Upper Austria (OÖ Energiesparverband, ESV) offers a comprehensive advice service and one-stop shop for energy efficiency and renewable energy projects:

- Over 10,000 face-to-face energy advice services/year for households, companies & municipalities on all topics relating to energy efficiency and renewable (including heating systems), taking place in the ESV office (drop-in advice in our one-stop shop) or on-site
- It reaches potential end-users while they are in an actual decision-making/ investment process (key time for influencing good decision-making towards efficient and renewable systems such as HPs) (e.g., through tradeshows, media work, cooperation with banks and municipalities information materials)
- Facilitating access to funding programmes (by receiving and processing funding application on behalf of the regional government
- The programme is embedded in a wider policy framework including regulatory measures "sticks", financial incentives "carrots" and information, advice, and training activities "tambourines", which has shown to be very successful in Upper Austria.

Objectives

What do the policy achieve?

- Activating homeowners and building owners
- Triggering and supporting energy efficiency and renewable energy investments (including HPs)
- Supporting stakeholders (including relevant professionals) throughout the customer journey
- Ensuring investments and installations (ex: of HPs) are conform to funding programmes (by checking and controlling investment measures on behalf of the regional government)

Outcome

What do the policy achieve?

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- Over 10,000 face-to-face energy advice services/year for households, companies & municipalities on all topics relating to energy efficiency and renewable (including heating systems)
- More than 60 % of space heating in Upper Austria already comes from renewable energy sources and district heating. In the past 10 years, greenhouse gas emissions in the building sector have been reduced by 32%. The energy advice service is a key element of this success.

Key learning points/comments

What can we learn from this policy?

Key aspects of the advice service are product independence, strong customer orientation and uncomplicated, fast, and free advice. The energy advice service accompanies people and companies in their decision-making process, supports them in investing in energy efficiency and renewable (including HPs), and helps them find the right funding option for their project.

It works best if the programme is embedded in a wider policy framework including regulatory measures "sticks", financial incentives "carrots" and information and training activities "tambourines". This has shown to be very successful in Upper Austria. The long-term commitment and funding by the regional government is a crucial success factor.

Relevance to HP4ALL

How can we apply these learning points to HP4ALL?

- The service reaches potential end-users while they are in an actual decision-making/ investment process (key time for influencing good decision-making towards efficient and renewable systems such as HPs)
- Brochures/information about heat pump technology can be used in energy advice sessions
- Product independence is important

Name	Efficiency criteria for HP funding programmes	**Type**	Regulatory measure
Date of establishment	2017		
Targeted stakeholders	End-users, manufacturers, planners, installers		

Brief Description

Briefly describe the policy: What is its approach? What stakeholders is targeted? What activities carry out? What do the policy do/offer?

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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.

In the case of HPs, stringent efficiency standards are criteria for end-users to access the regional funding programmes. End-users require HP systems that fulfil these criteria from manufacturers and planners, thus creating market pull. The criteria lead to innovation, higher customer satisfaction and more sustainable market growth.

Such 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.

The OÖ Energiesparverband, the regional energy agency, advises and supports both end users and installers in understanding and meeting these criteria and finding a suitable solution for different buildings.

This assures that only high-quality technologies are installed and that the further development of the HP sector contribute to energy efficiency and renewable goals.

Objectives

What do the policy achieve?

- supporting the development and implementation of high efficiency and renewable HP solutions
- assuring that only high-quality technologies are installed
- supporting acceptance and market uptake of innovative energy technologies

Outcome

What do the policy achieve?

- installation of high efficiency and renewable HP solutions
- high customer satisfaction and user acceptance
- driving innovation in the HP sector: trends that have emerged in recent years include combined systems (heating and cooling), hybrid systems (biomass and heap pump systems) and larger-scale systems for commercial applications and industry

Key learning points/comments

What can we learn from this policy?

- Legislation for buildings and heating and cooling systems can be strategically used to drive innovation towards higher efficiency and lower emissions.
- Setting criteria for funding programmes creates market pull, since end-users require HP systems that fulfil these criteria from manufacturers and planners.

Relevance to HP4ALL

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How can we apply these learning points to HP4ALL?

- They can set an example for other regions/country and act as best practice.
- They could serve as basis for policy recommendations in other regions/countries.

Name	Upper Austria's decarbonisation target ("AdieuÖl")	**Type**	Regional policy
Date of establishment	2019		
Targeted stakeholders	All stakeholders along the heating value chain, e.g., citizens, end-users, manufacturers, planners, installers, municipalities		

Brief Description

Briefly describe the policy: What is its approach? What stakeholders is targeted? What activities carry out? What do the policy do/offer?

The regional government of Upper Austria has set clear decarbonisation targets – including eliminating oil heating by 2035. The policy framework that is put in place to achieve these goals supports the development and implementation of high efficiency and renewable solutions – including heat pumps.

Upper Austria's dedicated measures for eliminating fossil-fuel heating systems include:

- **a clear regulatory framework for banning oil heating:** since 2019, no oil heating in new buildings; according to the federal government's programme, no replacement of broken boilers as of 2021; all boilers over 25 years-old must be replaced as of 2025; no more oil heating by 2035!
- **attractive financial incentives:** a regional subsidy of up to 3,900 Euro for the replacement of a fossil-fuel heating system, periodically supplemented with national funding
- **Stringent emissions and efficiency standards** for the new heating systems as criteria in the funding programmes to ensure high environmental standards
- **free on-site energy advice** for homeowners to guide investment decisions
- **a large-scale multiplier campaign** "AdieuÖl" (Goodbye oil) developed and managed by the OÖ Energiesparverband, supported by the Regional Minister of Energy.

Objectives

What do the policy achieve?

- Contributing to achieving decarbonisation goals and eliminating fossil-fuel heating in the region of Upper Austria by 2035.
- Assuring that fossil-fuel systems are replaced with highly efficient and renewable systems (such as HPs)

Outcome

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What do the policy achieve?

- More than 7,000 old oil boilers replaced in 2019 and 2020 alone
- In the 2019 funding programme, 35 % of the removed systems were replaced with HPs.
- The policy package contributes to the region's progress in the energy transition:
    - 60 % of the space heating already comes from renewable energy/district heating
    - 32 % reduction in greenhouse gas emissions in the building sector in the last 10 years
    - Decrease in the consumption of heating oil from 300 to around 200 million litres in the last 12 years

Key learning points/comments

What can we learn from this policy?

- The regional government's decarbonisation goals and the measures put in place to achieve them are a key driver for the HP market.
- Clearly identifying who to address with policy and information measures is an important step. Market analysis clarified the target group and developing an effective communication strategy with arguments they could relate to.
- The campaign reaches out to people in their social environment, motivates them to participate in multiple ways, and uses the power of civil society and community to build up momentum for the energy transition.
- The refurbishment of a heating system is not a small investment. This is a significant barrier, especially for low-income families. However, this stresses even more the need to act. It is crucial to reach socially vulnerable oil heaters now since subsidies cannot be given once legislation banning oil heating is in place.

Relevance to HP4ALL

How can we apply these learning points to HP4ALL?

- Underlines the importance of regional targets and policies in driving the energy transition and the development of the HP market.
- Can serve as inspiration for the development of policy packages in other regions/countries

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Annex 11 - Policy – Case studies examples for Europe wide

Name	The Green Deal	**Type**	EC Communication/ Policy
Date of establishment	2019		
Targeted	All aspects of legislation/society		
Brief Description			
The Green Deal is an action plan proposed by the Von der Leyen Commission, which affects all aspects of the economy. This proposal will boost the efficient use of resources and restore biodiversity while cutting pollution, helping towards the goal of ensuring that the EU is climate neutral by 2050. The EU will also provide 'financial support and technical assistance' to those who affected by the green transition through the Just Transition Mechanism, which will consist of at least 100 billion euros from 2021-2027.[6] The EU Climate Law proposed by the Commission will write into law the proposals set out by the Green Deal, such as the necessary steps needed to get to the 2050 target, as well as new EU targets for 2030.[7]			
Objectives			
The EU will: • Become climate neutral by 2050 • Protect human life, animals, and plants by cutting pollution • Help companies become world leaders in clean products and technologies • Help ensure a just and exclusive transition.[8]			
Outcome			
The ultimate outcome of this policy is that the EU will become climate neutral by 2050. However, there will also be other outcomes, such as the increased renovation of existing buildings and increased support to industry in the green transition.			
Key learning points/comments			
That governments must now make their focus decarbonisation, and that it must affect every sector of the economy to make an impact. At the same time, people and businesses must be supported to benefit from the green transition.			
Relevance to HP4ALL			
The green deal supports re-skilling opportunities through the Just Transition Platform. Additionally, an emphasis on becoming climate neutral can only increase the support for heat pumps and thus the number of workers that need to gain the relevant skills.[9]			

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Name	BUILD UP Skills	**Type**	Initiative
Date of establishment	2009		
Targeted	Professionals working in the building sector (both public and private)		

Brief Description

Through this initiative, the EU aims to equip the 'next generation' of construction works with the skills and knowledge needed to ensure building and renovation projects meet energy efficiency requirements. BUILD UP skills is managed by the Executive Agency for Small and Medium Sized Enterprises and aims to increase the number of professionals who can offer high energy performance renovations as well as nearly zero-energy buildings (NZEB). In the early stages of the initiative, the focus was on increasing the number of qualified trade professionals, now with its expansion under Horizon 2020, 'white collar' professionals are being targeted, such as engineers and architects. BUILD UP skills funds pilot trainings, with further trainings being funded through national support, commercial training, and such.

Objectives

An increase in the number of construction workers who can renovate buildings to make them high energy performance or NZEB. This would contribute towards increasing the current renovation rate, which would reduce the EU's energy consumption overall and fulfil climate objectives. It brings together Europe's collective intelligence on energy reduction in buildings, motivating them to exchange best working practices knowledge and transfer tools and resources.

Outcome

BUILD Up has some successful projects, such as:

- Build Up Skills Advisor BUStoB and PROF-TRAC projects
- Open training platform for building professionals
- New Training programs on deep energy retrofitting
- Improving the quality of nearly-Zero Energy Buildings.[27]

Key learning points/comments

From this policy we can learn that training and sharing knowledge is essential giving workers the key skills needed for the energy transition.

Relevance to HP4ALL

As HP4ALL encompasses the rationale behind BUILD UP, in that it brings together leading experts from across Europe, to achieve best practices. The tools developed by HP4ALL contribute towards the goals of this policy.

Name	European Climate Pact	**Type**	Commission Initiative
Date of establishment	December 2020		

[27] European Commission 'BUILD UP Skills' https://ec.europa.eu/easme/en/section/horizon-2020-energy-efficiency/build-skills (Last accessed 31 March 2021).

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Targeted	Labour organisations, educational bodies, public authorities

Brief Description

In its starting phase, the pact will prioritise action in four areas which they believe will bring immediate benefits. These are: green areas, green transport, green buildings, and green skills. This will eventually expand and cover topics such as sustainable consumption healthy food and sustainable diets, oceans, and other areas. It has an open mandate, and its scope will evolve based on the ideas and contributions of the people and organisations that become a part of it.

In terms of Green Skills, the pact will encourage businesses and organisations to get involved in the Pact for Skills to help and up- and re-skill workers, spread good practices and success stories gathered across European Programmes, help navigate the European Social Fund (which enables training for five million people in green jobs and the green recovery), link up with Erasmus+, encourage stakeholders, local authorities and communities to make use of the Just Transition Mechanism, and signpost to support programmes for higher education institutions to educate on environmental and climate impacts.[28]

Objectives

In terms of skills, the European Climate Pact will:
- Promote and support green employment
- Address the skilling and reskilling of workers
- Anticipate changes in workplaces in the future

The Climate Pact will actively support labour organisations, educational bodies, and public authorities, to help those seeking employment in the green economy.[29]

Outcome

The pact has already received over 3500 contributions from organisations and citizens following a public consultation. While it is too early to draw conclusions on outcomes, it is hoped that it brings everyone together to make climate-conscious choices for a greener Europe. In terms of green skills, it is hoped that it will support the transformation across sectors to a climate-neutral economy.[30]

Key learning points/comments

The contribution of citizens and organisations is important, as it allows those who are potentially targeted to give their input. This should be increasingly done, especially in areas such as reskilling, as those involved could give their opinion on how they would like to learn to maximise the uptake of initiatives.

Relevance to HP4ALL

[28] European Commission, 'European Climate Pact' https://ec.europa.eu/clima/policies/eu-climate-action/pact_en (Last accessed 31 March 2021).
[29] European Commission 'Green Skills', https://europa.eu/climate-pact/priority-topics/green-skills_en (Last accessed 31 March 2021).
[30] European Commission 'European Climate Pact' https://ec.europa.eu/clima/policies/eu-climate-action/pact_en (Last accessed 31 March 2021).

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This initiative addresses the skilling and reskilling of workers and supports educational bodies in their uptake of green skills.

Name	European Skills Agenda	**Type**	
Date of establishment	July 2020		
Targeted	European Industries, SMEs, the Single Market.		

Brief Description

Due to the rapid shift towards a climate neutral Europe and the digital transformation, it is important to ensure that people have the correct skills to grasp these opportunities. In addition, the Covid 19 crisis has had a significant impact on unemployment and the need to reskill. The new European Skills agenda builds upon the 2016 skills agenda and links to the European Digital Strategy, the Industrial and Small and Medium Enterprises Strategy, the Recovery Plan for Europe and increased support for youth Employment.

The agenda has actions organized around four 'building blocks', which are: a call to join forces in collective action, actions to ensure people have the right skills for jobs (including skills to support the twin transitions), tools and initiatives to support people in their lifelong learning pathways and a framework to unlock investment in skills.

Objectives

The European Skills Agenda sets out objectives to be achieved by 2025 (based on well-established quantitative indicators). Objectives are based around digital skills, unemployed adults (recent learning experience), participation of low-qualified adults and participation of adults in learning.[31]

Outcome

The European Skills Agenda aims at upskilling and reskilling, with ambitious objectives to be achieved in the next five years, to prepare for the green transition and to benefit from new opportunities.

Key learning points/comments

The government needs to take the initiative to encourage the uptake of green skills, and in preparing for the green transition issues such as unemployment can be combatted through the dissemination of training to those that need it.

Relevance to HP4ALL

[31] European Commission, 'European Skills Agenda' https://ec.europa.eu/social/main.jsp?catId=1223&langId=en (Last accessed 31st March 2021)

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The European Skills Agenda aims at up-skilling and re-skilling workers, which fits in with HP4ALL's ambition to increase the number of skilled workers. Additionally, the Agenda focuses on using these skills prepare for the green transition – which benefits technologies such as heat pumps over traditional heating and cooling methods.

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Annex 12 - Policy – Case studies examples at international level

1. Canada

Name	Policy on Green Procurement	**Type**	Policy on Green procurement
Date of establishment	This policy is effective as of April 1, 2006 and incorporates changes effective as of May 14, 2018.		
Targeted	The policy applies to all departments within the meaning of section 2 of the Financial Administration Act, unless specific acts or regulations override it.		

Brief Description

The federal government is a significant purchaser in Canada. As such, its activities impact the national economy and can influence both the price and the availability of goods and services, including construction services, in the marketplace. Through the increased promotion of environmental sustainability, and by integrating environmental considerations in its procurement process, the federal government can influence the demand for environmentally preferable goods and services, the ability of industry to respond to the escalating use of environmental standards in global markets, and the resiliency of Canadian assets to climate change.

Objectives

As part of its ongoing commitment to improve the environment and the quality of life of Canadians, this policy seeks to reduce the environmental impacts of government operations, promote environmental stewardship, and adapt to climate change by integrating environmental considerations in the procurement process.

Outcome

Green procurement is set within the context of achieving value for money. It requires the integration of environmental considerations into the procurement process including planning, acquisition, use and disposal. In this context, value for money includes the consideration of many factors such as cost, performance, availability, quality, and environmental performance. Green procurement also requires an understanding of the whole lifecycle of goods and services being acquired from resource extraction through to disposal, including the total cost of ownership, the relevant risks and opportunities, the environmental and economic costs, or benefits to society, and any environmental or economic non-monetized positive or negative impacts to society. In addition, the supporting administrative processes and procurement methods can also offer opportunities to reduce the environmental impacts of government operations.

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The policy also supports the federal government in targeting specific environmental outcomes where procurement can effectively be used to mitigate the impact of – or adapt to – environmental issues such as climate change and can support the protection of biodiversity, natural areas, air, soil, and water. Where decisions are made to move forward on realizing specific environmental outcomes through procurement, it is expected this will:

- demonstrate environmental leadership and influence industry and citizens to use environmentally preferable and climate-resilient goods, services, and processes.
- stimulate innovation and market development of, and demand for, environmentally preferred goods and services, making these available and mainstream for other sectors of society; and
- support emerging environmental technologies.[32]

Key learning points/comments

There are several key points:

- Government must take the lead in green procurement as well as support other governments in such endeavours.
- Green procurement is made as an investment and keeping in line with value for money propositions, meaning that it is as economically feasible as prior processes.
- The policy must be updated as per changing requirements, standards, or relevant additional instruments
- Green procurement involves a lifecycle approach that encompasses all levels of production

Relevance to HP4ALL

As Green procurement requires an understanding of the whole lifecycle of goods and services being acquired from resource extraction through to disposal, including the total cost of ownership, the relevant risks and opportunities, the environmental and economic costs, or benefits to society, and any environmental or economic non-monetized positive or negative impacts to society[33], the skills or professionals all along the value chain need to be taken into consideration. As such, the skills from designers (design phase) to installers (installing phase), maintenance staff (maintenance) and even updating/upgrading and replacement/disposal personnel need constant re-skilling and up-skilling.

2. California (USA)

Name	Building Energy Efficiency Standards (Energy Code)	**Type**	State and federal

[32] Government of Canada: Policy on Green Procurement, Date modified: 13.06.2018, https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573

[33] Government of Canada: Policy on Green Procurement, Date modified: 13.06.2018, https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573

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Date of establishment	2019
Targeted	Building owners, the heating, ventilation, and air conditioning industry, including manufacturers, distributors, and contractors, local governments and building officials.

Brief Description

The California Energy Commission and other agencies support and promote new construction standards for residential and non-residential buildings to be 100% electric to encourage the use of electric appliances and avoid the use of gas. Fossil fuel appliances, such as gas cookers, furnaces, and water heaters, emit pollutants known to harm health and increase the risk of asthma. One in eight Californians has asthma and asthma rates are even higher in low-income communities. In addition, building emissions are the leading source of premature deaths from air pollution state-wide in California, accounting for more than 6,000 premature deaths per year.

The State of California is currently working to reduce these health risks by increasing the use of clean and efficient all-electric alternatives, such as heat pumps. The next code cycle in 2025 aims to move towards an all-electric building code, resulting in 3 million metric tons of excess carbon emissions by 2030 and more than $1 billion of unnecessary spending on new gas connection infrastructure. California households expect in the coming years to save money on their energy bills with new heat pump appliances compared to their old gas appliances.

Objectives

The Building Energy Efficiency Standards (Energy Code) aims to improve on the 2019 Energy Code for new construction of residential and non-residential buildings, as well as extensions and retrofits. Workshops have been held where the revisions were presented, and public comments were obtained. The proposed rules will be adopted during 2021 and will take effect on 1st January 2023. The California Energy Commission (CEC) updates the standards every three years.

Outcome

To assist the State of California, meet its goal of reducing carbon emissions by 80% compared to 1990 levels by 2050, the Energy Code now allows for an all-electric pathway for compliance in addition to the existing mixed-fuel pathway. Doing so will allow California to take advantage of its success developing photovoltaic (PV) systems as a carbon-free energy source and use of heat pumps in residential and non-residential buildings while continuing to offer the flexibility of mixed-fuel options. There also are municipalities that are requiring projects to use the all-electric pathway for compliance as part of their Reach Codes. For more information and a comprehensive list of approved local ordinances, please visit localenergycodes.com.

Key learning points/comments

There are several key points:

- The Government should minimise the cost to society of reliable energy services provided by natural gas and electricity.

- The Government should improve the environment and encourage diversity of energy sources through improvements in energy efficiency and the development of renewable energy resources, such as wind, solar and geothermal energy.

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- The policy is not regulated by the federal energy sector, nor specifically by the local energy sector, but will depend on what specific activity is planned to be carried out to determine what kind of permit will be required.

Relevance to HP4ALL
The California State Government intends to regulate and promote the efficient construction of buildings in which heat pumps can be installed, which fits with HP4ALL's ambition to enable end users/customers to demand high quality solutions. Furthermore, this law focuses on the use of these competences to prepare for the ecological transition, which benefits technologies such as heat pumps over traditional heating and cooling methods.

3. China

Name	Law on the Promotion of Renewable Energies & Five-Year Plan for Renewable Energy Development	**Type**	
Date of establishment	2003		
Targeted			
Brief Description			
In 2015, China topped the list of countries with the largest installed capacity of energy from the direct use of geothermal energy. The most booming use has been geothermal heat pump installations. In 2015, GHPs accounted for 65.9% of the installed capacity in direct uses. After GHPs, the second most common use is district-heating. By 2015, geothermal heating provided heat for 60.32 million square metres, mainly in Tianjin and Hebei provinces[34]. China's policies and regulations regarding renewable energy development fall into three categories. fall into three categories. Like the way renewable policies are regulated in the United States, the central government is in charge of regulating the first levels of policies to be adopted, and it is up to local governments - municipal, provincial or district - to establish the third level of policy according to the guidelines provided by the central government[35]. The first-level policies, which are issued by the central government, provide general direction and guidance, and include the Chinese government's international environmental			

[34] International Geothermal Association. China - Direct Uses [on-line]. Available at: https://www.geothermal-energy.org/direct_uses/china.html

[35] U.S. Department of Energy's National Renewable Energy Laboratory. Office of Energy Efficiency and Renewable Energy. Renewable energy in China [online]. Available at: http://www.nrel.gov/docs/fy04osti/35786.pdf

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commitments and stance. As part of this regulation, in 2003 the central government enacted the Law for the Promotion of Renewable Energy (the "China Promotion Law").

Second-level policies - which also fall under the central government - specify development goals and plans, standardising the criteria to be adopted for the development of renewable energy. At this level, the Five-Year Plan for Renewable Energy Development is issued, and the Guidelines for Promoting the Exploration and Use of Geothermal Energy (the "Exploration and Use Guidelines") were issued.

Finally, third-level policies or regulations - to be issued by local governments - provide for specific practices and incentives and management. These third-level government policies are of great importance for the development of renewable energies, as they include special regulations on subsidies and tax deductions for the use of these technologies.

Objectives

Establish the legal nature of geothermal energy in China to regulate its exploitation.

Outcome

The China Promotion Law defines "renewable resource" as non-fossil energy, such as wind energy, solar energy, hydropower, bioenergy, geothermal energy, and ocean energy. The same law foresees that the development and use of resources should follow the general principles established by the central government, which should be adjusted to meet local conditions, and should be set out in a regional plan that addresses the specific objectives of the region, key projects, the layout of the region and, where appropriate, the safeguards to be required or specific processes to be followed.

The Exploration and Use Guidelines foresee that the development of geothermal use should be based on the ideology of "government guidance, company participation". Therefore, to promote the use of geothermal energy, the government itself should carry out exploration activities and identify low, medium, and high temperature zones in order to determine the type of use that can be made of geothermal energy in each area and thereby encourage private participation.

Key learning points/comments

There are several key points:

- To incentivise their use in both new and existing buildings, local governments should design incentives and benefits, and should themselves use these technologies in public buildings and utilities where appropriate.

- It is important to mention that, as each local government will have to issue specific rules that private parties will have to follow for the exploitation of geothermal resources, these rules vary from territory to territory. Currently, while some local governments such as Beijing and Shenyang have already issued provisions applicable in their territory, many other cities have not yet implemented any regulations.

- Despite general guidelines that mandate the simplification of procedures, in most cities it is necessary to deal with various authorities - such as energy, urban development, environmental, among others - to obtain authorisation for the use of geothermal

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energy, as there is no clear regulation regarding which authority should be responsible for issuing authorisations.

- The cities that have had the greatest boom in the development of these uses are those that have established a single management office that is responsible for analysing the proposed uses, issuing permits, and inspecting their correct application.

Relevance to HP4ALL

The Law on the Promotion of Renewable Energies & Five-Year Plan for Renewable Energy Development aims to regulate and promote the efficient construction of buildings in which heat pumps can be installed, which fits in with HP4ALL's ambition to enable end users/clients to demand high quality solutions. Additionally, this act focuses on using these skills prepare for the green transition – which benefits technologies such as heat pumps over traditional heating and cooling methods.

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Annex 13 – Current Incentives examples for Spain

Programme	Energy Rehabilitation in buildings (PREE)	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			

Objectives

Boosting sustainability in building

The Spanish building stock currently account for 30% of the final energy consumption, nevertheless significant potential for savings and incorporation of renewable energies may take place with appropriate measures.

The objective of PREE, on account that only 0.3% of existing buildings in Spain have undergone interventions in energy rehabilitation, is to give a boost to the sustainability of the existing building stock in Spain, through actions ranging from changes in the thermal envelope to the replacement of fossil fuelled thermal (self) generation supply by RES based ones such as biomass, geothermal, solar thermal or heat pumps, including the integration of smart regulation and control technologies.

Special support for vulnerable groups

In addition to its positive effects on energy efficiency improvements and environmental sustainability, PREE delivers on a social reach, as special attention and additional support is paid to rehabilitation actions in buildings hosting vulnerable groups affected by energy poverty situations and/or benefitting from social bond schemes.

PREE follows up on previous programmes (PAREER-CRECE and PAREER II), carried out between October 2013 and December 2018 with a total budget of 404 M€, allowing energy rehabilitation of more 80.000 households in Spain.

Supported actions

Eligible actions must involve buildings, including single-family households, collective residential housing, and tertiary buildings (new buildings and extensions / use changes of existing ones are not eligible) and fall within one or several of the following categories or types:

- Thermal envelope improvements

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- RES integration such as solar thermal, geothermal, biomass, heat pumps subsystems (where appropriate)
- Energy efficiency improvement of thermal installations and generation, distribution, regulation control and emission subsystems

Technologies covered

☒ Geothermal
☒ Solar thermal
☒ Biomass
☒ District heating and cooling
☒ Heat pump
☒ Thermal energy storage
☒ Cogeneration
☒ Integrated solutions
☐ Other:

Cofinancing and interest rate

15%-35% of total eligible investment (support may add up to a further 15% if social criteria are met, up to 15% if the building energy performance reaches class A and up to 20% for integrated actions).

Range of funding per project

Beneficiaries

☐ University
☐ Research centre
☒ Public authorities
☐ Start-up
☒ SME
☒ Mid-cap company
☒ Large company
☒ NGO
☒ Other: homeowners, building owners, building communities, ESCOs

Target area

☐ European Union
☒ MSs
☒ MSs' region/s
☐ Other:

Resources

300 M€ (2021 annuity)

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Managing authority
Spanish Ministry for Ecological Transition and corresponding regional Ministries
Contact/website
https://www.idae.es/en/support-and-funding/renovation-buildings/pree-program-building-energy-rehabilitation
Category
A) Incentive created by policy and legislation that increase actual HP numbers.

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Annex 14 – Current Incentives examples for Ireland

Programme	Heat Pump System Grant	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			
Objectives			
The objective of introducing the Heat Pump System Grant is to achieve the Climate Action Plan's set target of installing 400,000 heat pumps in existing homes.			
Supported actions			
This grant scheme encourages homeowners to install a heat pump in their dwelling by providing a grant of up to €3,500. To make sure installed heat pump is working efficiently, the homeowner will receive the grant amount only when their home is insulated to at least the 'Heat Pump Ready' (Maximum Heat Loss Indicator of 2 Watts/Kelvin/m2) levels. To ensure that a home is 'Heat Pump Ready' SEAI provides a further €200 grant to the homeowner that can be used to pay for a technical assessment of the home to be conducted by the SEAI registered Technical Advisor. Based on the technical assessment of whether a home is 'Heat Pump Ready' or not, the technical advisor will advise insulation measures to those needs to be implemented to achieve desired insulation level.			
Technologies covered			
☐ Geothermal ☐ Solar thermal ☐ Biomass ☐ District heating and cooling ☒ Heat pump ☐ Thermal energy storage ☐ Cogeneration ☐ Integrated solutions ☐ Other:			
Cofinancing and interested rate			
Range of funding per project			
The grant scheme provides grant of €200 for technical assessment to ensure dwelling is 'heat pump ready' and €3500 for heat pump installation.			
Beneficiaries			
☐ University ☐ Research centre			

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☐ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other:
Residential Buildings

Target area
☐ European Union ☐ MSs ☐ MSs' region/s ☒ Other: Ireland
Resources
Managing authority
Sustainable Energy Authority of Ireland (SEAI)
Contact/website
https://www.seai.ie/grants/home-energy-grants/heat-pump-systems/
Category
A) Incentive created by policy and legislation that increase actual HP numbers.

Programme	National Home Retrofit Scheme	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			
Objectives			
The National Home Retrofit Scheme was introduced with the aim of supporting the target of retrofitting 500,000 homes to a Building Energy Rating of B2 under Climate Action Plan 2019. The objective of the programme is to test, develop and grow the One-Stop-Shop model in Ireland, referenced in the Climate Action Plan to inform the Retrofit Task Force developing the new retrofit delivery model.			
Supported actions			
The National Home Retrofit Scheme provides grants for up to 50% of the overall deep retrofitting cost for homeowners to improve their building energy rating from C3 or below to B2 or higher. The scheme is applicable to larger blocks of houses which were built before 2006. The scheme will develop a "One Stop Shop" type of energy service for residential			

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service providers, employers, financial institutes, registered housing association, local authorities.

Technologies covered

☐ Geothermal
☐ Solar thermal
☐ Biomass
☐ District heating and cooling
☒ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☐ Other:

Attic, internal or external insulation
Heating system upgrades
PV solar panel for electricity
Heat pump to replace oil or gas
Window and door replacement
Demand Control Ventilation or Mechanical Ventilation with Heat Recovery
Certified wood burning stove
(3 or more energy upgrades are required to undertake apply for this scheme)

Cofinancing and interested rate

Range of funding per project

The funding scheme is divided in two sections 1) National Housing Retrofit where the grant amount is up to 35% of private household and local authority homes and the grant amount can be up to 50% for housing association homes. 2) Midland Retrofit – Private Homes Integration where the grant amount can be up to 35% for Private Non-energy poor households and is up to 80% for private energy poor households. Maximum grant amount available is €2 million. This grant is not open for individual homeowners.

Beneficiaries

☐ University
☐ Research centre
☐ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other:

Groups of private households, Registered housing association and Local Authorities

Target area

☐ European Union
☐ MSs

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☐ MSs' region/s
☒ Other:
Ireland

Resources

Managing authority

Sustainable Energy Authority of Ireland (SEAI)

Contact/website

https://www.seai.ie/grants/national-home-retrofit/

Category

B) Incentive created by policy and legislation that increase HP training / awareness.

Programme	Support Scheme for Renewable Heat	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			

Objectives

The aim of this grant scheme is to incentivize the adoption (including development and supply) of renewable heating system by bridging the gap between the installation and operational cost of renewable heating system and conventional fossil fuel system.

Supported actions

The renewable heating system grant is being offered to promote installation and operation of renewable heating system for the sectors not supported by the 'Emission Trading System'. The grant scheme covers the installation cost of renewable heating system using the air source heat pump, ground source heat pump and water source heat pump. To support the on-going operation of renewable heating system, this grant scheme offers reduced tariff support for biomass boiler and anaerobic digestion heating system for a period up to 15 years on annual review basis.
SEAI has defined a list of eligibility criteria to avail the grant scheme. Once a beneficiary meets all the eligibility criteria, they can apply through an online application in the SEAI website.

Technologies covered

☐ Geothermal
☐ Solar thermal
☒ Biomass
☐ District heating and cooling
☒ Heat pump
☐ Thermal energy storage

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☐ Cogeneration
☐ Integrated solutions
☐ Other:

Anaerobic Digestion Heating System

Cofinancing and interested rate

Range of funding per project

The grant scheme covers the 30% installation cost for eligible heat pump installation applications. For reduced tariff slab for operational cost is described in table below

Tier	Lower Limit (MWh/yr)	Upper Limit (MWh/yr)	Biomass Heating Systems Tariff (c/kWh)	Anaerobic Digestion Heating Systems (c/kWh)
1	0	300	5.66	2.95
2	300	1,000	3.02	2.95
3	1,000	2,400	0.50	0.50
4	2,400	10,000	0.50	0.00
5	10,000	50,000	0.37	0.00
6	50,000	N/A	0.00	0.00

Beneficiaries

☐ University
☐ Research centre
☒ Public authorities
☒ Start-up
☒ SME
☒ Mid-cap company
☒ Large company
☐ NGO
☒ Other:

Commercial, Industrial, Agriculture, District Heating, Public Sector and Other non-domestic heat user (non-ETS Sector)

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other:

Ireland

Resources

Managing authority

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

Sustainable Energy Authority of Ireland (SEAI)
Contact/website
https://www.seai.ie/business-and-public-sector/business-grants-and-supports/support-scheme-renewable-heat/
Category
A) Incentive created by policy and legislation that increase actual HP numbers.

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 15 – Current Incentives examples for Italy

Programme	**ECOBONUS**	**Type**	☐ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☒ Other: Tax deduction
Sub-programme			

Objectives

Promote energy efficiency in buildings proposing tax deductions.

Supported actions

The interventions that can be incentivized with Ecobonus and the respective deduction rates:

- 50% deduction rate:
- Windows and windows
- Solar shields
- Biomass boilers
- Class a condensing boiler

- 65% deduction rate:
- Global redevelopment of the building
- Condensing boilers class a + advanced thermoregulation system
- Condensing hot air generators
- Heat pumps
- Water heaters
- Enclosure insulation
- Solar collectors
- Hybrid generators
- Building automation systems
- Microgenerators

- From the 70% to the 85% of deduction rate:
- Interventions on common parts of condominiums

- 90% deduction rate:
- Facade bonus

Technologies covered

☒ geothermal
☒ solar thermal
☒ biomass

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

☒ District heating and cooling
☒ Heat pump
☒ Thermal energy storage
☒ Cogeneration
☒ Integrated solutions
☐ Other:

Cofinancing and interested rate

Tax deductions from 50% to 90% provided for building renovations.

Beneficiaries

☐ University
☐ Research centre
☐ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other: Citizens

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other: Italy

Resources

National founds

Managing authority

The documentation to take advantage of the deductions must be sent electronically to ENEA (National Agency for New Technologies, Energy and Sustainable Economic Development), which also plays a role of technical assistance to the users.

Contact/website

https://www.efficienzaenergetica.enea.it/detrazioni-fiscali/ecobonus.html

Category

A) Incentive created by policy and legislation that increase actual HP numbers.

Annex 16 – Current Incentives examples for Upper Austria

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

Programme	Regional subsidy for HP in residential buildings (up to 3 living units)	**Type**	☐ Grant ☐ Loan ☐ Guarantee ☐ Equity ☒ Subsidy ☐ Other:
Sub-programme			

Objectives

- Supporting the replacement of fossil-fuel heating systems with electrically operated heat pumps in residential buildings
- Supporting the installation of high-efficiency, renewable heating systems
- Supporting the achievement of the regional government's decarbonisation goals

Supported actions

This subsidy supports the replacement of fossil-fuel heating systems with an electrically operated heat pump in residential buildings (up to 3 living units).

Eligibility criteria:

- performance requirements, based on a seasonal efficiency calculation.
- strict noise limits for air-source HPs.
- HP must possess the national HP seal of approval according to the EHPA.
- HP must be combined with 3 $kW_{electrical}$ PV, 4 m^2 solar thermal or green electricity contract.
- no possibility (technically or economically) to connect to a high-efficiency local/district heating network within a radius of 35 metres.
- system must be installed professionally and in accordance with standards by an authorised company.

Technologies covered

☐ Geothermal
☐ Solar thermal
☐ Biomass
☐ District heating and cooling
☒ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☐ Other:

Cofinancing and interested rate

Range of funding per project

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

- Air-water HPs: 100 Euro/kW nominal heat output (max. 1,700 Euro)
- Geothermal, water-to-water or deep drilling (geothermal probe) HPs: 100-170 Euro/kW nominal heat output (maximum 1,700-2,800 Euro) – depending on performance based on a seasonal efficiency calculation
- bonus available for the simultaneous disposal of a fixed fossil fuel tank: 100 % of the net disposal costs (maximum 1,000 Euro)

Beneficiaries

☐ University
☐ Research centre
☐ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other: private households, residential building owners

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other: The region of Upper Austria

Resources

More information online: www.energiesparverband.at/foerderungen/privathaushalte/heizung/waermepumpe (in German only)

Managing authority

OÖ Energiesparverband, on behalf of the regional government

Contact/website

OÖ Energiesparverband – Regional Energy Agency of Upper Austria

office@esv.or.at, www.energiesparverband.at

Category

A) Incentive created by policy and legislation that increase actual HP numbers.

Programme	National subsidy "raus aus Öl und Gas" (eliminating oil and gas) in private residential buildings	**Type**	☐ Grant ☐ Loan ☐ Guarantee ☐ Equity ☒ Subsidy
Sub-programme			

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

			☐ Other:

Objectives

- Support the replacement of fossil-fuel heating systems with environment-friendly heating systems in private single-family, 2-family and town houses.
- Supporting the installation of high-efficiency, renewable heating systems
- Supporting the energy transition in Austria

Supported actions

This subsidy supports the replacement of fossil-fuel heating systems (oil, gas, coal, electricity) with environment-friendly heating systems (biomass heating, heat pump or connection to a high-efficiency local/district heating system) in private single-family, 2-family and town houses.

Eligibility criteria for heat pumps:

- maximum flow temperature of the heat distribution system of 40 °C.
- HP must possess the national HP seal of approval according to the EHPA.
- refrigerant Global Warming Potential (GWP) below 2,000.
- for single-family and 2-family houses, only HPs <100 kW.
- no possibility to connect to a high-efficiency local/district heating network

Technologies covered

☐ Geothermal
☐ Solar thermal
☒ Biomass
☒ District heating and cooling
☒ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☐ Other:

Cofinancing and interested rate

Range of funding per project

- 5,000 Euro, maximum 35 % of the eligible investment's costs
- For heat pumps with a refrigerant with a GWP between 1,500 and 2,000, funding is reduced by 20 %.

Beneficiaries

☐ University
☐ Research centre

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

☐ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other: owners of single-family houses, 2-family houses, and town houses

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other: Austria

Resources

More information online: www.energiesparverband.at/foerderungen/privathaushalte/heizung/waermepumpe (in German only)

Managing authority

Kommunalkredit Public Consulting, on behalf of the national government

Contact/website

OÖ Energiesparverband – Regional Energy Agency of Upper Austria

office@esv.or.at, www.energiesparverband.at
and

Kommunalkredit Public Consulting

heizung@kommunalkredit.at, www.raus-aus-öl.at

Category

A) Incentive created by policy and legislation that increase actual HP numbers.

Programme	National subsidy "raus aus Öl und Gas" (eliminating oil and gas) in multi-storey residential buildings	**Type**	☐ Grant ☐ Loan ☐ Guarantee ☐ Equity ☒ Subsidy ☐ Other:
Sub-programme			

Objectives

- Support the replacement of fossil-fuel heating systems with environment-friendly heating systems in multi-storey residential buildings (> 3 living units).

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

- Supporting the installation of high-efficiency, renewable heating systems
- Supporting the energy transition in Austria

Supported actions

This subsidy supports the replacement of fossil-fuel heating systems (oil, gas, coal/coke, electricity) with environment-friendly heating systems (biomass heating, heat pump or connection to a high-efficiency local/district heating system) in multi-storey residential buildings (> 3 living units).

Eligibility criteria for heat pumps:
- no possibility to connect to a high-efficiency local/district heating network
- maximum flow temperature of the heat distribution system of 40 °C.
- HP must possess the national HP seal of approval according to the EHPA.
- refrigerant Global Warming Potential (GWP) below 2,000

Technologies covered

☐ geothermal
☐ solar thermal
☒ biomass
☒ District heating and cooling
☒ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☐ Other:

Cofinancing and interested rate

Range of funding per project

- Replacement of fossil-fuel heating systems:
  - < 50 kW: 5,000 Euro
  - 50 - 100 kW: 8,000 Euro
  - > 100 kW: 10,000 Euro
- For heat pumps with a refrigerant with a GWP between 1,500 and 2,000, funding is reduced by 20 %.
- If the heating system is centralised: 1,500 Euro/newly connected residential unit
- maximum 35 % of the eligible investment's costs

Beneficiaries

☐ University
☐ Research centre
☐ Public authorities

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

☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other: owners of multi-storey residential buildings (> 3 living units)

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other: Austria

Resources

More information online: www.energiesparverband.at/foerderungen/privathaushalte/heizung/waermepumpe (in German only)

Managing authority

Kommunalkredit Public Consulting, on behalf of the national government

Contact/website

OÖ Energiesparverband – Regional Energy Agency of Upper Austria

office@esv.or.at, www.energiesparverband.at
and

Kommunalkredit Public Consulting

heizung@kommunalkredit.at, www.raus-aus-öl.at

Category

A) Incentive created by policy and legislation that increase actual HP numbers.

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 17 – Current Incentives examples for Europe wide

Programme	Just transition Scheme	**Type**	☒Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme	Just Transition Fund		

Objectives

It aims to alleviate the social and economic costs resulting from the transition towards a climate-neutral economy, through a wide range of activities directed mainly at diversifying the economic activity and helping people adapt in a changing labour market.

That should enable regions, people, enterprises, and other stakeholders to effectively tackle the social, employment, economic and environmental consequences of the transition to a climate-neutral economy.

Supported actions

It will, for example, support workers to develop skills and competences for the job market of the future

Technologies covered

☐ Geothermal
☐ Solar thermal
☐ Biomass
☐ District heating and cooling
☐ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☒ Other: JTF will support investments in areas such as digital connectivity, clean energy technologies, the reduction of emissions, the regeneration of industrial sites, the reskilling of workers and technical assistance.

Cofinancing and interested rate

The fund will be equipped with 40 billion euros. This amount corresponds to fresh money made available to support EU countries in their transition, out of which €10 billion should come from budget appropriations, while the remaining additional resources of €40 billion, covering the period from 2021 to 2024, will constitute external assigned revenue stemming from the European Recovery Instrument.

Range of funding per project

Member States that have not yet committed to implementing the objective of achieving a climate neutrality by 2050 will only be awarded 50% of their planned allocation.

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

Beneficiaries
☐ University ☐ Research centre ☒Public authorities ☐ Start-up ☐ SME ☐ Mid-cap company ☐ Large company ☐ NGO ☐ Other:
Target area
☐ European Union ☒ MSs ☒ MSs' region/s ☐ Other:
Resources
40 billion euros
Managing authority
European Commission's Directorate General for Regional Policy.
Contact/website
Contact page: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism/just-transition-platform-contact-page_en Website: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism/just-transition-funding-sources_en
Category
B) Incentive created by policy and legislation that increase HP training / awareness.

Programme	European Social Fund	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			
Objectives			
The ESF has different objectives, among them: • promoting employment and supporting labour mobility • promoting social inclusion and combating poverty			

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

- investing in education, skills and lifelong learning enhancing institutional capacity and an efficient public administration

Supported actions

The ESF pretends to close the existing 'skills gap' by giving job-seekers the modern skills and qualifications – including 'green skills' – that are in demand by employers.

Technologies covered

☐ Geothermal
☐ Solar thermal
☐ Biomass
☐ District heating and cooling
☐ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☒ Other: The ESF pretends to close the existing 'skills gap' by giving job-seekers the modern skills and qualifications – including 'green skills'

Cofinancing and interested rate

ESF funding is always accompanied by public or private financing. Co-financing rates vary between 50% and 85% (95% in exceptional cases) of the total project costs depending on the relative wealth of the region.

Range of funding per project

The level of ESF funding and the types of projects that are funded differ from one region to another depending on relative wealth. EU regions are divided into three funding categories based on their regional GDP per head compared to the EU average (EU with 27 Member States).

Beneficiaries

☐ University
☐ Research centre
☒ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☒ NGO
☒ Other: it is funding tens of thousands of local, regional, and national employment-related projects throughout Europe: from small projects run by neighbourhood charities to help local disabled people find suitable work, to nationwide projects that promote vocational training among the whole population.

Target area

☐ European Union

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

☐ MSs
☒ MSs' region/s
☐ Other:

Resources
The ESF Plus has a total budget of **€88 billion** (in 2018 prices)
Managing authority
European Commission: Employment, social affairs, and inclusion
Contact/website
Contact page: https://ec.europa.eu/social/main.jsp?catId=2&langId=en&acronym=contact https://ec.europa.eu/esf/main.jsp?catId=25&langId=en Website: https://ec.europa.eu/esf/home.jsp
Category
B) Incentive created by policy and legislation that increase HP training / awareness.

Programme	ERASMUS +	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme	Sector Skills Alliances (2020)		
Objectives			
Sector Skills Alliances aim at tackling skills gaps regarding one or more occupational profiles in a specific sector. They do so by identifying existing or emerging sector-specific Labour market needs (demand side), and by enhancing the responsiveness of initial and continuing vocational education and training (VET) systems, at all levels, to the labour market needs (supply side).			
Supported actions			
Improving skills intelligence and providing a clear strategy and instruments to address skills shortages in specific economic sectors. Also, the transition to a circular and greener economy needs to be underpinned by changes to qualifications and national education and training curricula to meet emerging professional needs for **green skills**.			
Technologies covered			
☐ Geothermal ☐ Solar thermal ☐ Biomass ☐ District heating and cooling ☐ Heat pump ☐ Thermal energy storage ☐ Cogeneration ☐ Integrated solutions			

Horizon 2020 European Union Funding for Research & Innovation

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☒ Other: The sector Skills Alliances promotes that the transition to a circular and greener economy needs to be underpinned by changes to qualifications and national education and training curricula to meet emerging professional needs for **green skills**.

Cofinancing and interested rate

ESF funding is always accompanied by public or private financing. Co-financing rates vary between 50% and 85% (95% in exceptional cases) of the total project costs depending on the relative wealth of the region.

Range of funding per project

The level of ESF funding and the types of projects that are funded differ from one region to another depending on relative wealth. EU regions are divided into three funding categories based on their regional GDP per head compared to the EU average (EU with 27 Member States).

Beneficiaries

☒ University
☒ Research centre
☒ Public authorities
☒ Start-up
☒ SME
☒ Mid-cap company
☒ Large company
☒ NGO
☐ Other: Any participating organisation established in an Erasmus+ Programme Country can be the applicant.

Target area

☒ European Union
☐ MSs
☐ MSs' region/s
☐ Other:

Resources

In 2020, the indicative total budget for the Sector Skills Alliances programme was up to:

- 700 000 € for 2 years and 1 000 000 € for 3 years in **Sector Skills Alliances for design and delivery of VET (Lot 1)**
- 4 000 000 € for 4 years in **Sector Skills Alliances for implementing a new strategic approach ("Blueprint") to sectoral cooperation on skills (Lot 2)**

Managing authority

EACEA: Education, Audio-visual, and Culture Executive Agency

Contact/website

Website: https://eacea.ec.europa.eu/erasmus-plus/actions/key-action-2-cooperation-for-innovation-and-exchange-good-practices/sector-skills_en
Contact: EACEA-EPLUS-SSA@ec.europa.eu

Category

B) Incentive created by policy and legislation that increase HP training / awareness.

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 18 – Current Incentives examples at international level

A. Canada

Programme	FortisBC Central or ductless heat pump loans	**Type**	☐ Grant ☒ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme	N/A		
Objectives			
To upgrade an electric furnace or baseboard heaters to a high-efficiency central or variable speed mini- or multi-split air source heat pump.			
Supported actions			
Upgrade an electric furnace or baseboard heaters to a high-efficiency central or variable speed mini- or multi-split air source heat pump.			
Technologies covered			
☐ Geothermal ☐ Solar thermal ☐ Biomass ☐ District heating and cooling ☒ Heat pump ☐ Thermal energy storage ☐ Cogeneration ☐ Integrated solutions ☐ Other:			
Cofinancing and interested rate			
The low-interest loan can be paid back over a 10-year term. The heat pump must meet energy-efficiency requirements: • variable speed mini-split: minimum Heating Seasonal Performance Factor (HSPF) of 10 and Seasonal Energy Efficiency Ratio (SEER) of 18 • variable speed multi-split: minimum HSPF of 9.5 and SEER of 16 • central system: minimum HSPF 8.5 and SEER of 15 There is also an alternative $2,000 rebate on qualifying high-efficiency heat pumps			
Range of funding per project			
Loan of up to $6,500 at a 1.9 per cent interest rate			
Beneficiaries			
☐ University			

Horizon 2020 European Union Funding for Research & Innovation

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☐ Research centre
☐ Public authorities
☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other:

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other:

Resources

Depend on managing authority funding

Managing authority

Fortis BC

Contact/website

Contact: electricrebates@fortisbc.com.
Website: https://www.fortisbc.com/rebates/home/air-source-heat-pump-loan

Category

A) Incentive created by policy and legislation that increase actual HP numbers.

Programme	Manitoba Hydro Home Energy Efficiency Loan	**Type**	☐ Grant ☒ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme	Geothermal and cold climate air source heat pumps		

Objectives

The Home Energy Efficiency Loan is a convenient and affordable financing option to make energy efficiency upgrades to homes. The monthly payment will be added to the clients' energy bill and no down payment is required.

Supported actions

For geothermal heat pumps and solar photovoltaic systems.

Geothermal (ground source) heat pumps

- The heat pump must be designed and installed by a certified contractor. The contractor must be recognized by the Manitoba Geothermal Energy Alliance (MGEA).
- The geothermal heat pump must be tested and rated under CSA Standard C-13256 and installed to meet CSA C448.
- Installer must submit a building heat loss calculation to determine appropriateness of sizing of the heat pump system.

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

Cold climate air source heat pumps

- The system must be a cold climate air source heat pump with a variable capacity compressor, rated to provide heat at temperatures of at least −25°C.
- The air source heat pump unit's performance rating certified to CSA Standard CAN/CSA-C656-05 with a minimum HSPF of 10. Units must have a minimum COP of 1.75 at −15°C.
- Indoor and outdoor units must be part of an AHRI matched system.
- ENERGY STAR® certified.
- Home must be currently heated with electric resistance heat.
- Installer must be a refrigeration mechanic licensed in Manitoba.
- Installer must submit a building heat loss calculation to determine appropriateness of sizing of the heat pump system.

Technologies covered

☒ Geothermal
☒ Solar thermal
☐ Biomass
☐ District heating and cooling
☒ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☒ Integrated solutions
☐ Other:

Cofinancing and interested rate

- Annual interest rate is fixed at 4.8% (O.A.C.) for the first 5 years of the loan.
- Minimum monthly payment is $15.
- Minimum amount that can be financed is $500.
- Monthly instalments will be applied to your energy bill. Repayment of the loan is the responsibility of the owner and not the tenant.
- Additional payments may be made at any time with no penalty.
- A $20 administration fee will apply for complete payments prior to 6 months.
- The loan becomes due and payable when the house is sold. The loan is not transferrable.
- The cost of 1 upgrade cannot be split between 2 Home Energy Efficiency Loan Agreements or between financing programs.

Range of funding per project

Financing up to $20,000 per residence for geothermal heat pumps and solar photovoltaic systems. The total value of all loans at one property where these technologies are financed cannot exceed $20,000. The maximum term is 15 years if the loan is for a high efficiency natural gas furnace or boiler, heat pump, or solar system.

Beneficiaries

☐ University
☐ Research centre
☐ Public authorities

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

☐ Start-up
☐ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other:

Target area

☐ European Union
☐ MSs
☐ MSs' region/s
☒ Other:

Resources

Depend on managing authority funding

Managing authority

Manitoba Hydro

Contact/website

Website: https://www.hydro.mb.ca/your_home/residential_loan/

Category

A) Incentive created by policy and legislation that increase actual HP numbers.

B. Australia

Programme	Workforce Training Innovation Fund	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			

Objectives

- Improve the efficiency, flexibility and responsiveness of the training and TAFE system in meeting industry skill needs and business training requirements.
- Encourage partnerships between industry bodies, businesses, TAFEs, and training organisations to improve workforce productivity through innovative training programs and modes of delivery.
- Build industry productivity and contribute to broader social and economic gains in priority sector workforces.
- Build new insights and evidence to support the design, adoption, and implementation of sustainable innovation across the wider training and TAFE system

Supported actions

- **New training, products, and methods**
  Innovation in course development, product design and training delivery, supporting training and TAFE system improvements that drive social, economic, and global success.

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

- **Applied research**
  Research solving 'real world' industry and business productivity challenges and the study of innovation in training design and delivery and product development.
- **Workforce training and skills development**
  Improving accessibility, relevance, and delivery of workplace skills to support business productivity and learner employability.
- **Priority sectors**
  Design of skills development approaches for new and emerging industries, key priority growth industries, and the Victorian government priority sectors.

Technologies covered

☐ Geothermal
☐ Solar thermal
☐ Biomass
☐ District heating and cooling
☐ Heat pump
☐ Thermal energy storage
☐ Cogeneration
☐ Integrated solutions
☒ Other: directed towards designing skills development approaches for key priority growth industries as well as developing sustainable innovation across training.

Cofinancing and interested rate

Range of funding per project

- **SEED FUNDING:** Funding up to $50,000 for a project idea that is responding to an identified and defined problem and requires 'seeding activity' (duration of up to four (4) months) to support the preparation of a complete application for grant funding.
- **GRANT FUNDING:** Funding up to $5 million for collaboration between industry and training providers to deliver innovation in training, workforce development and applied research (duration of up to two years)

Beneficiaries

☒ University
☒ Research centre
☒ Public authorities
☐ Start-up
☒ SME
☐ Mid-cap company
☐ Large company
☐ NGO
☒ Other: training providers (Victorian TAFE, local learn organisation, registered training providers) and industry (unions and peak bodies...)

Horizon 2020 European Union Funding for Research & Innovation

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Target area
☐ European Union ☐ MSs ☐ MSs' region/s ☒ Other:
Resources
Depend on managing authority funding
Managing authority
Victoria state government
Contact/website
Website: https://www.education.vic.gov.au/training/providers/funding/Pages/wtif.aspx Contact: wtif@education.vic.gov.au.
Category
B) Incentive created by policy and legislation that increase HP training / awareness.

Programme	National Skills Strategies	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme	Energising Tasmania		
Objectives			
Energising Tasmania will make it attractive for Tasmanians to access vocational education and training to meet energy sector skills needs through nationally recognised training.			
Supported actions			
Key activities for Energising Tasmania include: 1. Tasmanian Energy and Infrastructure Workforce Advisory Committee: established to provide advice to the Tasmanian Government on the implementation of the Energising Tasmania commitment. 2. Energising Tasmania Training Fund: established to for Endorsed Registered Training Organisations to deliver fully subsidised training for energy, infrastructure, and related sectors. 3. Energy and Infrastructure Training Market Development Fund: established to support training system capability to meet the needs of energy and infrastructure sectors. 4. Energy and Infrastructure Workforce Development Fund: established to support workforce development key recommendations from relevant workforce development activity for energy and infrastructure sectors.			

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Technologies covered
☐ Geothermal ☐ Solar thermal ☐ Biomass ☐ District heating and cooling ☐ Heat pump ☐ Thermal energy storage ☐ Cogeneration ☐ Integrated solutions ☒ Other: vocational education and training to meet energy sector skills needs through nationally recognized training.
Cofinancing and interested rate
The Commonwealth's funding contribution will not be reduced where Tasmania secures funding from other activity partners
Range of funding per project
Tasmania will report annually against the agreed milestones during the operation of this Agreement, The Commonwealth will provide the agreed quantity after the presentation of the report.
Beneficiaries
☐ University ☐ Research centre ☒ Public authorities ☐ Start-up ☐ SME ☐ Mid-cap company ☐ Large company ☐ NGO ☐ Other:
Target area
☐ European Union ☐ MSs ☐ MSs' region/s ☒ Other:
Resources
Over $16 million over four years from 2019-20
Managing authority
Agreement between Commonwealth of Australia (the Commonwealth) and Tasmania

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Contact/website
Website: https://www.skills.tas.gov.au/about/current_projects/energising_tasmania Informative pdf: https://www.federalfinancialrelations.gov.au/content/npa/skills/project-agreement/FPA_Energising_Tasmania.pdf
Category
B) Incentive created by policy and legislation that increase HP training / awareness.

C. USA

Programme	Incentives for renewable energy	**Type**	☒ Grant ☐ Loan ☐ Guarantee ☐ Equity ☐ Subsidy ☐ Other:
Sub-programme			
Objectives			
In the United States there are renewable energy regulations at three levels, federal, state, and local. There are about 1785 incentives at the state level, and you will find them all on an educational map, by state, in the Database of State Incentives for Renewables & Efficiency[36]. One of the countries with the most benefits in the use and implementation of this type of energy. States such as Oregon have 102 incentives in the form of loans, tax credits, economic aid, rebates, and other programmes. Most incentives in energy policy in the USA take the form of financial incentives. Main objectives: • Reduce carbon dioxide emissions. • Reduce electricity and oil consumption.			
Supported actions			
Technologies covered			
☒ Geothermal ☒ Solar thermal ☐ Biomass ☒ District heating and cooling ☒ Heat pump ☐ Thermal energy storage ☐ Cogeneration ☐ Integrated solutions ☐ Other:			

[36] https://www.dsireusa.org

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Cofinancing and interested rate
There have been many incentives created through US energy policy. Most recently, the Energy Policy Act in 2005, the Energy Independence and Security Act in 2007, and the Emergency Economic Stabilisation Act in 2008 each promote various energy efficiency improvements and encourage the development of specific energy sources. USA energy policy incentives can serve as a strategic way to develop certain industries that plan to reduce USA dependence on foreign oil products and create jobs and industries that drive the national economy. The ability to do this depends on which industries and products the government chooses to subsidies. Examples of these include tax exemptions, tax reductions, tax breaks, discounts, loans, and targeted financing.
Range of funding per project
Go to Database of State Incentives for Renewables & Efficiency (https://www.dsireusa.org) for further information.
Beneficiaries
☐ University ☒ Research centre ☒ Public authorities ☐ Start-up ☒ SME ☒ Mid-cap company ☒ Large company ☐ NGO ☐ Other:
Target area
☐ European Union ☒ MSs ☐ MSs' region/s ☐ Other:
Resources
Depend on managing state funding
Managing authority
USA government
Contact/website

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Category
A) Incentive created by policy and legislation that increase actual HP numbers.

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Annex 19 – Interviews with Policymakers

a. Spain

Entity Name	Institute for Energy Diversification and Saving (IDAE)	**Location**	Madrid (Spain)
Type	Public administration		
Website	https://www.idae.es		
Q1: Which national or local regulations are particularly relevant/most effective to promote the installation of HPs in your country? Are there any other regulations that are particularly relevant as a success story or good practice to promote the installation of heat pumps? If so, why?			
Mainly RITE and the Technical Code. None of these encourage the use of heat pumps, but rather regulate their installation and use.			
Q2: What current or planned lines of financing from your organisation can cover the purchase/installation of heat pumps? Under what financing conditions? Are there any restrictions or premiums regarding the type of equipment? Do you know of any other programme or initiative that you consider important to mention as a success story or good practice to promote the installation of heat pumps in relation to the abovementioned?			
The PREE PROGRAMME. ENERGY REHABILITATION OF BUILDINGS programme, which was approved by the Council of Ministers, at the proposal of the Ministry for Ecological Transition and the Demographic Challenge, on 4 August 2020. This programme regulates the aid programme for energy rehabilitation actions in existing buildings and regulates the direct granting of aid under this programme to the Autonomous Communities and the cities of Ceuta and Melilla.			
Q3: Do you have any line of support for the training / capacity building of installation and maintenance technicians or construction workers in relation to the installation and maintenance of heat pumps or other air conditioning and/or water/electricity/gas supply equipment? Has it been useful for the sector? Can you indicate strengths and weaknesses?			
There are several EU projects (Build Up Skills) on training and accreditation of energy efficiency and renewable energy training. These are projects for the training of both operators and personnel with higher technical qualifications. The most recent project of this type is the Construye2020+ http://construye2020plus.eu/ In addition, I would like to mention that within the framework of the new Clean Energy Transition (CET) sub-programme of the LIFE Programme 2021-2027, the continuation of the Build Up Skills initiative is planned, which is an initiative to promote the training of workers in the construction sector.			
Q4: In terms of public procurement, can you tell us if your organisation or others you know of have carried out tenders for the purchase of heat pumps or more generally for the improvement of the energy efficiency of your facilities? Could you describe it very briefly? Could you cite any tender in the above case that could fall under the concept of green public procurement?			

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We don't know

Entity Name	Andalusian Energy Agency (AAE)	**Location**	Seville (Spain)
Type	Public administration		
Website	https://www.agenciaandaluzadelaenergia.es/es		
Q1: Which national or local regulations are particularly relevant/most effective to promote the installation of HPs in your country? Are there any other regulations that are particularly relevant as a success story or good practice to promote the installation of heat pumps? If so, why?			
At regional level there is no other legal or administrative provision, but at European level the European Data Protection Board (EPDB) is in review and open for public consultation until 22nd June 2021.			
Q2: What current or planned lines of financing from your organisation can cover the purchase/installation of heat pumps? Under what financing conditions? Are there any restrictions or premiums regarding the type of equipment? Do you know of any other programme or initiative that you consider important to mention as a success story or good practice to promote the installation of heat pumps in relation to the abovementioned?			
Currently the PREE and the Order DE of the Junta de Andalucía are the existing lines, but it is expected that in the new framework other more important lines of aid will be implemented in the framework of the Renovation Wave, which is one of the pillars of the Recovery Plan of the European Union and in which up to 35 million buildings are expected to be renovated. The links to both programmes are PREE (Programme for the Energy Renovation of Buildings) https://www.agenciaandaluzadelaenergia.es/es/ayudas-la-financiacion/incentivos-2017-2021/programa-de-rehabilitacion-energetica-de-edificios-pree-en-andalucia Sustainable Building Line Order DE of the Andalusian Regional Government https://www.agenciaandaluzadelaenergia.es/es/financiacion/incentivos-2017-2020/programa-para-el-desarrollo-energetico-sostenible-de-andalucia/construccion-sostenible			
Q3: Do you have any line of support for the training / capacity building of installation and maintenance technicians or construction workers in relation to the installation and maintenance of heat pumps or other air conditioning and/or water/electricity/gas supply equipment? Has it been useful for the sector? Can you indicate strengths and weaknesses?			
Not at present, but it would be interesting to develop it in the future.			
Q4: In terms of public procurement, can you tell us if your organisation or others you know of have carried out tenders for the purchase of heat pumps or more generally for the improvement of the energy efficiency of your facilities? Could you describe it very briefly? Could you cite any tender in the above case that could fall under the concept of green public procurement?			
At the level of the Andalusian Regional Government, there is a REDEJA Investment Plan of 27 M€ for the improvement of the energy efficiency of the installations. REDEJA is the Energy Network of the Andalusian Regional Government, and its function is to promote efficiency			

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principles within the Andalusian administration in the contracting of energy supplies, energy saving and efficiency actions and to implement renewable energy installations in its buildings.

Entity Name	Construction Labour Foundation (FLC)	**Location**	Madrid (Spain)
Type	Public administration		
Website	https://www.fundacionlaboral.org/en/		

Q1: Which national or local regulations are particularly relevant/most effective to promote the installation of HPs in your country? Are there any other regulations that are particularly relevant as a success story or good practice to promote the installation of heat pumps? If so, why?

Mainly RITE and the Technical Code. None of these encourage the use of heat pumps, but rather regulate their installation and use.

Q2: What current or planned lines of financing from your organisation can cover the purchase/installation of heat pumps? Under what financing conditions? Are there any restrictions or premiums regarding the type of equipment?
Do you know of any other programme or initiative that you consider important to mention as a success story or good practice to promote the installation of heat pumps in relation to the abovementioned?

The PREE PROGRAMME. ENERGY REHABILITATION OF BUILDINGS programme

Q3: Do you have any line of support for the training / capacity building of installation and maintenance technicians or construction workers in relation to the installation and maintenance of heat pumps or other air conditioning and/or water/electricity/gas supply equipment? Has it been useful for the sector? Can you indicate strengths and weaknesses?

I believe that two training options could fit here, both of which are subsidised and therefore free of charge for the trainees:

1. Continuous training programmes, where we offer training to workers in the sector.
2. Through vocational training for the unemployed. We are accredited in different certificates of professionalism, among them those of the installation and maintenance family. Some of these courses deal with air conditioning installations. These accreditations are carried out by autonomous communities and depending on the autonomous public administration, they finance some certificates or others. We have also carried out this type of training through the financing of local entities (city councils or provincial councils).

As to whether it has been useful for the sector, it is obvious that we have trained professionals who provide the sector with qualified labour.

- Strengths: quality training, with official recognition, eminently practical and where they acquire the necessary skills to access the labour market.

Weak points: these training courses are very rigid in terms of content, making it difficult to adapt to the speed of change in the sector and the entry of new materials and procedures.

Q4: In terms of public procurement, can you tell us if your organisation or others you know of have carried out tenders for the purchase of heat pumps or more generally for the improvement of the energy efficiency of your facilities? Could you describe it very briefly? Could you cite any tender in the above case that could fall under the concept of green public procurement?

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FLC does not participate in supply tenders. All the tenders in which we participate and execute are related to training, so our experience in public procurement is null.

b. Ireland

Entity Name	University College Cork	**Location**	Cork / Ireland
Type	University.		
Website	www.ucc.ie		
Q1: Which national or local regulations are particularly relevant/most effective to promote the installation of HPs in your country? Are there any other regulations that are particularly relevant as a success story or good practice to promote the installation of heat pumps? If so, why?			
New Builds: Existing legislation to meet the requirements of NZEB do not explicitly state the need to deploy heat pumps as the primary heat source, therefore we can achieve NZEB requirements using high efficiency CHP / Boilers etc. Refurbishment: If the space to be refurbished is greater than 25% then NZEB applies. However, in practice this is avoided through design. The upcoming climate action plan is due to be transposed into law and should position the use of heat pumps as the primary heating source for new and existing buildings within the public sector. If the climate action plan is passed through it will have a real impact in the deployment of HP in the sector.			
Q2: What current or planned lines of financing from your organisation can cover the purchase/installation of heat pumps? Under what financing conditions? Are there any restrictions or premiums regarding the type of equipment? Do you know of any other programme or initiative that you consider important to mention as a success story or good practice to promote the installation of heat pumps in relation to the abovementioned?			
Capital Programs are typically financed from the exchequer / through EIB funding or through philanthropy. Ongoing upgrades and equipment replacement programs are typically financed from one off grant aid / sinking fund or from operational savings. We had previously run an ESCO process for a district heating system, but it did not stack up financially or from an environmental aspect. The existing EXEED and SEAI grant schemes would not be financially structured to lend itself to the promotion of heat pump installation, i.e., the level of grant aid available will only cover 5-25% of the installation.			
Q3: Do you have any line of support for the training / capacity building of installation and maintenance technicians or construction workers in relation to the installation and maintenance of heat pumps or other air conditioning and/or water/electricity/gas supply equipment? Has it been useful for the sector? Can you indicate strengths and weaknesses?			
Given the size of our estate and equipment value we have set a high pre-qualification level for the service contracts on our significant energy consuming equipment. While we would			

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experience a premium for setting the high qualification requirements, it is recouped in the expertise that we tap into and ensures our equipment is maintained.

Capital Projects / Minor works are awarded through public works contracts – performance measurement / verification and penalties are very complex and difficult to execute.

Q4: In terms of public procurement, can you tell us if your organisation or others you know of have carried out tenders for the purchase of heat pumps or more generally for the improvement of the energy efficiency of your facilities? Could you describe it very briefly? Could you cite any tender in the above case that could fall under the concept of green public procurement?

Through our established mechanical framework, we have tendered for the installation of an ASHP to replace end of life atmospheric boilers. While not the most cost optimal solution in terms of capital cost, we are executing the project as a pilot for retrofitting heat pumps into an existing 1990's building without undertaking significant upgrades on the fabric of the building.

In relation to the general improvement of the energy efficiency of our facilities, our energy efficiency projects are driven from an operational aspect, i.e., the equipment has failed in service and /or cannot provide a reliable service. A classic example of that would be lighting. While we have a range of light fitting types such as T8, induction, CFL, LED etc the primary driver for our recent lighting upgrade projects were driven by high lighting failures in the building and obsolete fittings and controls. While other lighting projects in different areas would have delivered marginally more savings, we take the view that we sweat the assets to end of life, ensure good operational controls and track the energy consumption so we can verify operational control.
We have and continue to look at alternative funding streams that will allow us to accelerate our energy programs – the EPC model is more than likely the most viable route to finance for us to undertake significant system upgrades.

c. Italy

ENEA is an Italian public research body that operates in the energy, environment, and new technologies sectors in support of competitiveness and sustainable development policies. It is supervised by the Ministry of Ecological Transition.

Organization name	ENEA	**Location**	ITALY
Type of organization	NATIONAL AGENCY		
Website	https://www.enea.it/it		

Q1: Which national or local regulations are particularly relevant / most effective for promoting the installation of heat pumps in your country? Are there any regulations that are particularly relevant as they have stimulated a particular success story or the development of good practices to promote the installation of heat pumps? If so, how?

The national legislation (mandatory) which allows to largely promote the use of heat pumps for the air conditioning of environments (winter and summer) and to produce domestic hot water is the Legislative Decree 3 March 2011, n. 28 Implementation of Directive 2009/28 / EC on the promotion of the use of energy from renewable sources.
In fact, the Decree obliges (Annex 3):
"In the case of new buildings or buildings undergoing major renovations, the thermal energy production plants must be designed and built in such a way as to ensure simultaneous

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compliance with the roof, using energy produced by plants powered by renewable sources, of the 50 % of the expected consumption for domestic hot water and 50% of the sum of the expected consumption for domestic hot water, heating and cooling.
For public buildings, the obligations referred to in the previous paragraphs are increased by 10%. "
The same Decree also obliges the construction of a photovoltaic system whose minimum electrical power is linked to the floor plan of the building at ground level.

A second Decree that tends to largely promote the use of heat pumps for air conditioning (winter and summer) and to produce domestic hot water is the Interministerial Decree of 26 June 2015 "Application of performance calculation methods energy and definition of the prescriptions and minimum requirements of buildings ". The Decree imposes minimum energy performances for all buildings (new and existing) that can be reached using heat pump generators.

Q2: What current lines of finance that you know or are planning by your organization can cover the purchase / installation of heat pumps? Under what terms of financing? Are there any restrictions or rewards regarding the type of technology?
Do you know of any other program or initiative that you consider important to mention as it has stimulated a success story or good practice to promote the installation of heat pumps in relation to the above?

The current financing schemes that are foreseen to cover the purchase / installation of heat pumps managed by ENEA are the “Tax deductions”: Home Bonus, Ecobonus, Super Ecobonus 110%.
For more information visit the dedicated website:
https://detrazionifiscali.enea.it/

Another important current line of financing that is planned to cover the purchase / installation of heat pumps managed by the GSE (Energy Services Manager - https://www.gse.it/) is the Thermal Account 2.0.
For more information visit the dedicated website:
https://www.gse.it/servizi-per-te/efficiency-energetica/conto-termico

(All these financing schemes are described in the documents provided by RINA-C)

Q3: Do you have (or are aware of) a support line for training / strengthening the skills of installation and maintenance technicians or construction workers in connection with the installation and maintenance of heat pumps or other air conditioning equipment and / or the supply of water / electricity / gas? Was it useful for the industry? Can you indicate strengths and weaknesses?

Art. 15, of the Legislative Decree. 28/2011 and S.M.I makes it compulsory to attend refresher courses for Technical Managers, installers, and maintainers of renewable energy systems. The various Regions have prepared the training standards for training courses for "installer and extraordinary maintenance technician of energy plants powered by renewable sources (RES)":
- Biomass and biomass plants for energy use.
- Heat pumps for heating, refrigeration and DHW production.
- Solar thermal and photovoltaic plants and systems.

Q4: On the subject of public procurement, can you tell us if your organization or other organizations you know have made tenders for the purchase of heat pumps or more

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generally for the improvement of the energy efficiency of their systems? Could you describe it very briefly? Could you mention some tenders in the above case that could fall under the concept of green public procurement?
This issue is more pertinent to an industrial entity than to an entity such as ENEA and therefore we are unable to give you support.

d. Belgium

Entity Name	Techlink	**Location**	Belgium
Type	Technical Federation		
Website	Techlink.be		
Q1: Which national or local regulations are particularly relevant/most effective to promote the installation of HPs in your country / Europe wide? Are there any other regulations that are particularly relevant as a success story or good practice to promote the installation of heat pumps? If so, why?			
About the interviewed organisation: Techlink is the first and only professional federation that connects, strengthens, and represents all technology and installation companies (such as electrical & HVAC). Techlink helps its more than 3000 members maintain a strong position in a sector in transition. The operation is based on a strong national structure, 10 provincial departments, Sector Councils, sector committees and disciplinary partnership with the umbrella Construction Confederation (national, regional, and local). Through services and advocacy in the economic, social, societal, and legal fields, collective labour agreement negotiations and lobbying, Techlink is the representative of the Belgian installation market with its passion and experience. Techlink is recognized as a national professional federation by the Minister of Economy, SMEs, Self-employed and Energy. Answer to the question: In Belgium, you have three kinds of regulations. You have the Brussels regulation, the Flemish Regulation, and the Wallonia Regulation. The one which is particularly destroying heat pump businesses is the taxation system on electricity. Electricity (kWh) is a mechanism to have a tax income for governments, so this is not a question, but this is the reality. So now going back to the question, what is boosting the heat pump installation? I would say nothing. Nothing is boosting heat pump installation. Heat pumps are very unsuccessful in Belgium. In Wallonia they are non-existent, in Flanders there are let's say 3%. Helping it a little bit is the EPBD. So, if you build a new house or if you do a serious energy renovation you need to fulfil certain demands on energy. It gives you points that you must reach and if you install heat pumps for instance. A Geothermal heat pump helps you a lot in enhancing your EPBD Score, together with installation etc, so that is pushing so newly built homes are being pushed by that, but the biggest opposite of pushing is the electricity taxation system.			
Q2: What current or planned lines of financing from your organisation can cover the purchase/installation of heat pumps? Under what financing conditions? Are there any restrictions or premiums regarding the type of equipment? Do you know of any other programme or initiative that you consider important to mention as a success story or good practice to promote the installation of heat pumps in relation to the abovementioned?			

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This role of the Federation is to bring to the attention of our members that heat pump is something that's that is new technology that that can make your business its own. But we are not. We are not financing them. We're not subsidizing them. That's not the role of our organisation.

The Belgian Government is very aware of the fact that there are nearly no taxes on gas, but all taxes on electricity for the moment. They won't do enact a taxation switch to gas because they promote today heat pumps in two ways. They promote for new builds with the EPD, which is a regulation, and they promote it through subsidies. €1000 for this €2000 for that.
It is so complicated that nobody follows anymore. Which subsidy you can have for what, but at the same time the economics are not correct for heat pumps because you pay taxes on the electricity that you use for your heat pump, which, so on the one hand they give a little subsidy (a positive). On the other hand, people don't trust the system anymore, and that's bad for investment trusts, and that's bad for heat pumps.
It is very easy (to find out about the subsidies) you go in front if you go to the website of VLAIO and you click a few buttons and you have it, but you must already be really motivated to click and search. There are different options if you build new if you renovate you, so you must be familiar. If you are familiar with it, it is not bureaucratic. Once you know how to navigate the website, you easily get your subsidy. So, the mainstream people don't know about it and don't use it. It's not mainstream.
Journalists then write articles on taxation or electricity and people lose trust and so on. So, it's a hot topic in Belgium, on this subsidy versus taxation. Government knows about it, but it hinders the success of heat pumps, together with a few other issues, of course. Low temperature renovation and low temperature. On the one hand, together with evolutions on electricity going from an analogue to digital meter, meaning that you can't virtually stock electricity anymore. That's a big issue lately in Flanders, meaning that people lose trust because government plans A but then does B etc., which is a double impact on heat pumps because in the past you could install this photovoltaic will take on your roof, which produces electricity in the summer that you could use for feeding your heat pump in the winter, this was legislation and they said they would keep it. But now the courts said this is not allowed anymore. So, politics are being called back so you can't use your heat pump anymore with electricity from your photovoltaic, so the heat pump sector is suffering for the time being.
In terms of another programme or initiative which can be considered a success story, I think there is the project that we did two years ago 'Slagkracht voor de vernieuwende installateur', which we did in Flanders to make installers aware of heat pump technology and other projects that tackling as a Federation did together with the Flemish Federation of Renewable Energy, the Heat Pump Platform and COGEN, the Federation of Cogeneration.
I think that was a good project because it improved awareness that there is something else than a standard gas fired border which is still in Flanders the standard commodity. So that was project but well, it was very local project of course, but I think that is that is good because it was a project that those showed installations, that raised awareness of the possibilities of the installations that that gave the course on the basics of the heat pump, what to do? What not to do? So, for me that was a good example of how projects deliver useful information and useful practical awareness or boosts practical awareness. For me that was a good project.

Q3: Do you have any line of support for the training / capacity building of installation and maintenance technicians or construction workers in relation to the installation and maintenance of heat pumps or other air conditioning and/or water/electricity/gas

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supply equipment? Has it been useful for the sector? Can you indicate strengths and weaknesses?

The Belgian government again is split between Flanders and Wallonia, and is following the RES certification, which is the European legislation that is focused on the training of renewable technologies including heat pumps and photovoltaic. It is a system that is already installed in Belgium and one we are also working on to make it a little bit more practical, but there is a system in place. It is called RESCert.
Strength and weaknesses. Yes, it was linked in the past to obtaining subsidies, so your installer needed to have obtained this education before he could work on your heat pump installation, and this would allow you to obtain the subsidy.
But that is now not available in Wallonia, but it still operates in Flanders, so that is a good thing to push it a little bit, but people don't know about it. That's the first point.
Second point, there are some ongoing discussions, now amongst others with us with technique also on the improvement of the quality of these courses, as these courses were quite erratic and the link between following this course and being able to do a good installer job was there are some points of improvement, so it's an ongoing process.

Q4: In terms of public procurement, can you tell us if your organisation or others you know of have carried out tenders for the purchase of heat pumps or more generally for the improvement of the energy efficiency of your facilities? Could you describe it very briefly? Could you cite any tender in the above case that could fall under the concept of green public procurement?

No, that's not the job of a Federation. We don't write public procurement or tender documents whatsoever.
I know there have been ideas in Wallonia to make this, but it's not active so no, pass here. I don't know, I don't think so that there are specific tender documents, but I'm not sure for boosting heat pumps.
There are tender documents describing heat pumps for new buildings and so on, but I I'm not aware of a straight line in public procurement tendering that is boosting heat pumps as the technology, not to my knowledge.

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