





Clean heat readiness in Europe: A survey of Member States

Trinomics 



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Clean heat readiness in Europe: A survey of Member States

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Executive Summary

This report provides an overview of clean heat implementation and overall readiness in Europe, focusing on national policies, incentives, and support systems. It was conducted on behalf of the Clean Heat Europe Coalition, which advocates for affordable and climate-friendly heating for households across Europe.

The report covers 12 countries and highlights the urgent need to shift from fossil fuels to zero-emission heating systems. It identifies a wide range of scores across Member States, with Lithuania and Finland leading the way. Clear deadlines and support mechanisms are crucial for the adoption of clean heating solutions.

Areas for improvement include integrating clean heat information into Energy Performance Certificates and providing comprehensive support for economically vulnerable households. Cost remains a barrier, and governments should reassess taxes and levies on electricity.

This report provides valuable insights to guide future policy and investment in clean heating solutions, emphasizing the importance of political action and supportive policy environments.

Please note that these findings are based on available information and analysis conducted during the research process.

1. Introduction

This report provides a high-level snapshot of clean heat implementation and overall readiness in Europe, looking at national policies and timelines for phasing out fossil fuels in heating, policies and incentives supporting clean heat, and training and support systems in place for the clean heat transition nationally.

This study has been conducted on behalf of the [Clean Heat Europe Coalition](#).¹ The coalition advocates for more affordable, accessible, and climate friendly heating for households across Europe, and calls for political action in support of every European's right to clean heat. The coalition works at the EU level and is supported by a robust framework of national and local member associations and partners. The coalition's main goal is to raise awareness among policymakers about the social, economic, and environmental advantages offered by clean heating. The coalition is dedicated to highlighting the potential of clean heat technologies and outlining pathways to their implementation.

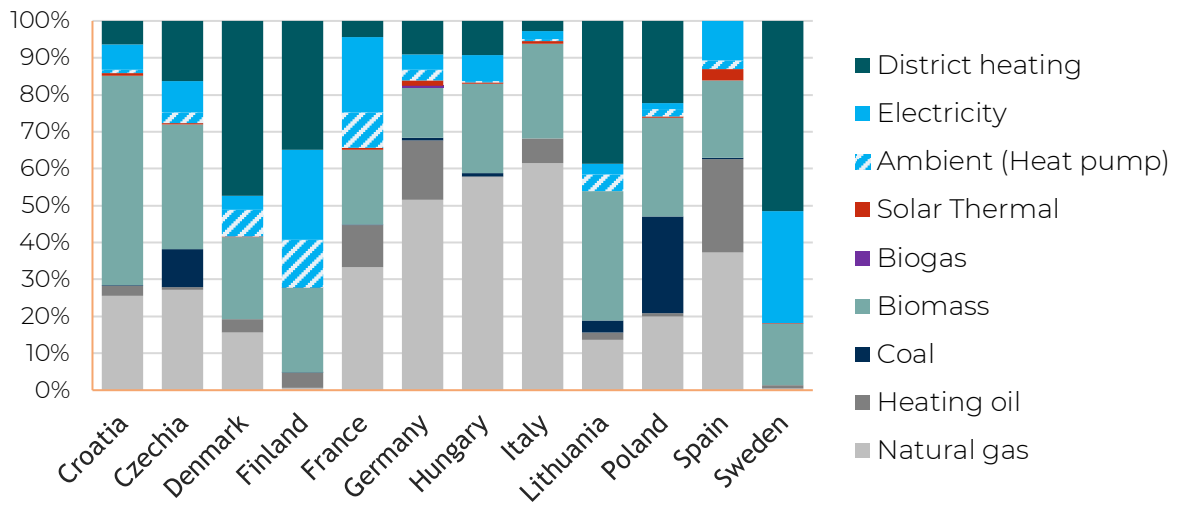
In the European Union, space heating is the largest energy consumer in homes, accounting for approximately 65% of total energy use, with water heating contributing 14.5%.² Since 2000, the reliance on fossil fuels for domestic energy has marginally declined. However, 75% of European homes still rely on outdated fossil heating systems (see Figure 1). There is a pressing need for European households to shift to zero-emission heating systems that can run on renewable energy sources (RES) such as rooftop solar PV.³ Important technologies and systems that can deliver clean heat include heat pumps with rooftop solar PV, (low-temperature) district heating and rooftop solar thermal panels. It is essential to guarantee that these solutions are affordable, appealing, and accessible to all consumers. Acknowledging the basic right of consumers to clean heating, it is vital for policymakers to create a supportive policy environment that enables this change. Figure 1 shows the current heating technologies used in the selected countries.

¹ <https://www.cleanheateurope.eu/>

² [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households#:~:text=In%202021%2C%20most%20of%20the,derived%20heat%20\(8.6%20%25\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households#:~:text=In%202021%2C%20most%20of%20the,derived%20heat%20(8.6%20%25))

³ https://www.coolproducts.eu/wp-content/uploads/2023/07/Mission-Possible-Briefing_EEB-Coolproducts-1.pdf

Figure 1 Share of heating technologies/fuel use (space + water heating) of households for the 12⁴ countries in scope in 2021.⁵



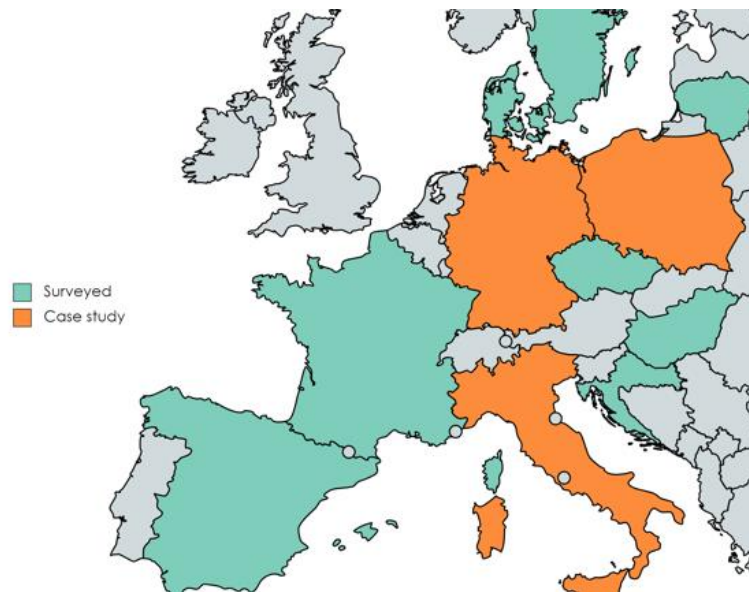
The study covers 12 countries: Croatia, Czechia, Denmark, Finland, France, Germany, Hungary, Italy, Lithuania, Poland, Spain, and Sweden (see Figure 2). Among them, Germany, Italy, and Poland were selected for deep dives to look in more detail at specific policy and legislation efforts happening at the Member State level. These countries were chosen for their varied legislative landscapes, favourable subsidy schemes, differing levels of heat pump integration, and district heating development. They also differ in their capacity for scaling up clean heat generation and retrofitting infrastructure for energy efficiency (i.e., number of installers, availability of suitable RES, etc.). Analysing these countries provides a cross-section of Europe's diverse clean heating challenges and opportunities, with potential to guide future policy and investment in clean heating solutions.

⁴ Eurostat heat pump data for Sweden was unavailable, however, in 2020 Sweden had approximately 1.46 million used heat pumps in 2020 according to <https://www.energimyndigheten.se/>, https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.energimyndigheten.se%2F499bae%2Fglobalassets%2Fstatistik%2Fofficiell-statistik%2Fstatistikprodukter%2Fenergistatistik-i-smh-fbhlok%2Ftabeller%2Frapport_01v01_sam2020_resultattabeller.xlsx&wdOrigin=BROWSELINK (accessed 18 April, 2024)

⁵ Eurostat (2022). Disaggregated final energy consumption in households: https://ec.europa.eu/eurostat/databrowser/view/nrg_d_hhq/default/table?lang=en. Note that fuel for space cooling and cooking is not included.

Note: Eurostat data on heat pumps is missing for Sweden.

Figure 2 Member States included in this study



2. Methodology

The study included a survey of 18 questions, focused on three areas (1) the status of mainstreaming clean heat nationally, (2) ensuring the affordability of clean heat, and (3) addressing barriers to clean heat deployment. The full list of questions can be found in the Annex 1. The survey was originally sent to national association experts in heating in the 14 Member States, with complete responses received from 12.

The study used the national knowledge of the network of Clean Heat Europe member associations. These national experts utilised data and expertise from a wide range of sources. The collected information was standardised to ensure consistent treatment / coverage across the Member States being analysed.

Each question and Member State (MS) were given an overall, weighted score. Full compliance/implementation gave 1 point, whereas partial implementation or support, as well as legislation and plans that are “under development” scored 0.5 points, and no/missing answers received 0 points.

Limitations – While every effort has been made to make this work as accurate and current as possible there are a number of limitations and constraints.

- The world of energy policies and prices can be fast moving so the information upon which this report is based can quickly change and become outdated.
- To have comparable data on energy prices we have used EU wide data - the key source is the EU energy costs and prices work⁶ – using 2022 data, collected in 2023.
- The purpose of this work is to offer a snapshot. This requires some simplification of the position of each MS. This means that, for example, there may be regional or local

⁶ https://energy.ec.europa.eu/data-and-analysis/energy-prices-and-costs-europe_en

provision of some of the services and offers that are of interest, but this would be interpreted as partial. Although carefully constructed, this structured method is unavoidably a simplification of the progress towards clean heating of the analysed countries, to increase comparability. Hence, the weighted scores should not be interpreted as definite scores of a country's clean heating progress.

3. Overall picture of clean heat implementation

The main results are presented under the three groups of questions; section 3.1: Making clean heating the norm, 3.2 Ensuring that clean heat is affordable for all, and 3.3 Addressing the barriers to clean heat deployment .

3.1. Making clean heating the norm

The questions and responses for each country were as follows:

No	Question	Croatia	Czechia	Denmark	Finland	France	Germany	Hungary	Italy	Lithuania	Poland	Spain	Sweden
1	Has the government agreed to a timeline for phasing out fossil heating?	Partially	Under development	Yes	Yes	Yes	Yes	Partially	Under development	Yes	No	No	Yes
2	Has the government proposed or enacted legislation including end-dates for phasing-out the installation of fossil fuel-only boilers in new and existing homes?	Partially	Partially	Partially	Yes	Yes	Yes	No	Partially	Yes	Partially	No	No
3	Has the government communicated timelines for the upgrading of the worst energy performing buildings? (For example, through minimum energy performance standards)	Partially	No	No	No	Yes	Yes	No	No	No	Yes	Yes	Partially
4	Is individualised technical support and assistance available to support consumer’s choices of existing solutions? (For example, via one-stop-shops, deep renovation support/guidance/financing)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Partially	Partially	Yes	Yes
5	Separate from technical support, are there awareness and information sharing campaigns?	Yes	Yes	Partially	Yes	Under development	Yes	No	Yes	Yes	Yes	Yes	Yes
6	Does every household have access to information about switching to clean heating, its available options and the necessary steps (via EPC or renovation passport)?	No	Yes	Partially	Yes	Yes	Yes	No	Partially	No	No	No	No
7	Is there a requirement for clean heating technologies to be interoperable and remote-controllable?	No	No	0	Partially	No	0	No	Yes	No	No	No	No

On an encouraging note, half of the Member States surveyed have timelines for phasing out fossil fuel heating and have proposed or implemented laws to cease the installation of fossil fuel-only boilers in both new and existing buildings. Four have timelines partially implemented or under development. To support these efforts, national governments are providing targeted technical support and assistance to consumers, exemplified by initiatives like one-stop shops and comprehensive renovation guidance, painting a generally positive landscape for the adoption of clean heating practices in these Member States. Nine of the countries surveyed offer some form of technical assistance, and two offer partial support.

However, there is still a need for better guidance to help decision-makers initiate the transition. While technical assistance is accessible post-decision, after purchase/installation of a clean heat solution, in half of the countries there is a shortfall in upfront information at the household level, particularly regarding Energy Performance Certificates (EPCs) or renovation passports. Only four countries have readily available information for all household on making the switch. Furthermore, often the support services offered do not include information on issues which bring in additional complexity but are necessary to a successful clean heat transition. This results in a lack of awareness on part of the consumers, which could benefit from such measures. These aspects include electrical connections/upgrades, the opportunities and feasibility of using low temperature heating solutions, and interoperability and flexibility solutions.

Many of today's heat pumps are not interoperable with EV-charging, batteries, solar PV. Owners thus miss synergies of joint deployment and might face difficulties in the coming years, as for example, flexibility markets develop, and legislation will be adapted. Therefore, devices should be interoperable and remote-controllable, so they can play a role in a flexible building system and for applications such as relieving grid congestion or operating during times of low demand. A further complexity hindering the realisation of these advantages is that often devices do not share a common data interface and, consequently, cannot communicate with each other. The survey/questionnaire shows that an interoperability requirement of clean heating technologies is rare, and it is generally non-existent in any MS. However, in Germany, heat pumps must possess the capability to be remotely controlled and support the grid.

Energy Performance Certificates in Finland

According to the Energy Performance of Building Directive, EPCs should provide information and guidance on finding more information for improving the Efficiency of the building, however, this is not always the case, especially in the case of MSs that do not require an on-site evaluation for the EPC assessment. Finland has a robust EPC system, with qualified assessors and quality checks overseen by the government. Overall, there is strong implementation throughout the country. While Finland does not currently implement a renovation passport—a detailed roadmap for sequential energy improvements—the EPC presents recommendations on how to enhance the energy efficiency of the building. For buildings that rely on fossil-fuel boilers, the EPC becomes a tool for promoting clean heat by suggesting specific upgrades. Depending on the qualified assessor offering the EPC, the level and detail of recommendations varies.

As indicated above, while most countries do provide public financial assistance to lower the initial purchase cost of heat pumps – and/or other clean heating systems - this support is often too limited, to make clean heating systems sufficiently attractive. Overall, 5 countries indicated full availability of public support for clean heat technologies, 7 have partial support or programmes are underway, indicating that most Member States provide some form of support. Crucially, most countries only subsidise the heating system itself and do not support other measures which are necessary to enable the building to operate with such a technology. For example, in the case of heat pumps (and PV) only respondents from Poland and Spain have indicated that financial support to upgrade the electrical system of a building is available – See Polish case study for further information on best practice. Similarly, other measures, such as comprehensive building renovations are only subsidised in six cases. Heat and electricity storages, further enablers of the energy transition are supported in five and four countries respectively.

3.2. Ensuring that clean heat is affordable for all

The questions and responses for each country were as follows:

No	Question	Croatia	Czechia	Denmark	Finland	France	Germany	Hungary	Italy	Lithuania	Poland	Spain	Sweden
8	Is the price ratio between gas, electricity, oil, and district heating supportive of a switch to clean heating? Please identify a source of (official) data for average consumer price for gas, electricity, oil and district heating. (For example, by moving taxes and levies away from clean heating or by implementing a carbon tax)	No	Yes	No	Yes	Under development	No	Yes	No	Yes	No	No	Yes
9	Are there public financial support schemes for installing clean heating technologies? Support can be tax benefits (e.g., a VAT rebate), direct support of installation cost, subsidy on sale of produced energy, loan benefits (e.g., guarantees, favourable loans, etc.), accelerated depreciation	Partially	Partially	Partially	Partially	Yes	Yes	Partially	Yes	Partially	Yes	Partially	Yes
10	Are support schemes available that specifically incentivise the smart combination of clean building technologies, i.e. heat pumps + solar?	Partially	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
11	Are there currently subsidies for fossil heating? (For example grants for new/replace oil/gas boilers, fuel subsidies, etc Note: this question should be interpreted the other way around: Yes, means fossil support and No means clean heat: Here Yes will be counted as No and No as Yes	Partially	Partially	No	No	No	Yes ⁷	Partially	Yes	No	Yes	Yes	Yes
11b	If yes: is there a plan to end these subsidies in the next 5 [10? By 2030?] years?	Yes	0	Yes	Yes	Yes	yes	No	No	Yes	No	Yes	No
12	Is there specific support (see categories in Q9) for the most vulnerable households for clean heating, according to the MS definition? Include what the MS definition of vulnerable is.	Yes	No	No	Yes	Yes	Yes	0	No	Yes	Yes	No	No

⁷ At the time of writing the report (December 2023-February 2024 Germany still had fossil fuel subsidies in place. Deadlines for the phase out of these subsidies were March 2024.

One of the most promising individual heating solutions are heat pumps. Over their lifetime, heat pumps can provide heating at lower costs than current fossil fuel alternatives and with significant energy and emission savings. This is true across a range of different contexts, as heat pumps can operate with thermal energy from different sources (ground, air and water).

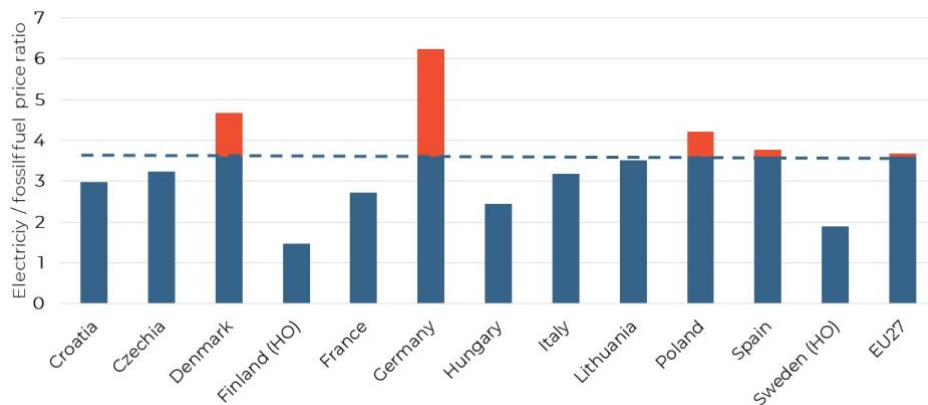
Nevertheless, an important limitation of heat pumps is the price ratio between electricity and gas and other fossil fuels used for heating. If this ratio is too unfavourable towards electricity, heat pumps will not deliver financial savings. To make heat pumps fully viable and, therefore, to ensure cost-effectiveness of the support mobilised for heat pumps the operational costs of heat pumps have to become relatively low compared to fossil alternatives. As mentioned, the key need here is a reduction in the price of electricity relative to gas, heating oil, or coal. In most countries, typical household electricity prices, due to higher wholesale prices but also taxes and levies, are currently significantly higher for electricity per kWh than for gas or heating oil. This high electricity-to-fossil fuel-price ratio not only makes a switch to electrical alternatives unattractive, but also increases the amount of subsidy needed to make a heat pump sufficiently attractive.

Lowering this price ratio – which governments can do in a (budget-neutral manner) through shifting taxes from electricity to the fossil alternative – therefore can increase the cost-efficiency of other financial government support significantly and overall makes heat pumps more attractive. Such tax shifts have recently been implemented in a number of Member States, including the Netherlands.⁸ Such a shift can lead though to relatively higher energy costs for households that cannot switch to clean heating, which are often poorer households.

In the 12 examined countries, the price ratio in Denmark, Germany, and Poland were the highest and above 3.6 (see **Error! Reference source not found.**). This 3.6 threshold is based on the (average) efficiency difference between heat pumps and fossil boilers; in other words, it's the ratio above which even the operational fuel costs of heat pumps are higher than for fossil heating.

⁸ Dutch government (2023). [Tax plan 2024](#).

Figure 3 Electricity to fossil fuel price ratio in selected Member States.



Notes: The graph shows the ratio between the electricity price and gas or heating oil (depending on the use in a MS). Other common fuels such as coal and biomass (see Figure 1) are not included in this specific analysis.

Note that this analysis is based on data from 2021.⁹ The assumed wholesale energy prices can vary significantly leading to varying price ratios, which can explain the different ratio in this study compared to others. Dedicated lower tariffs for heat pumps, such as in Finland, are also not taken into account in the figure. In the annex in Figure 5 more details can be found which also shows the split between wholesale price, taxes and fees, showing the role a tax shift could play in making electricity relatively more attractive.

A second impediment to heat pumps is the high initial cost (purchase + installation costs), which makes them less attractive, or impossible, for many households, who lack the financial means to make such an investment.

10 out of the 12 surveyed countries indicate that governments have put in place subsidies for heat pumps. The two remaining countries are Italy and Sweden. In the former case, the subsidy for heat pumps exists indirectly in certain cases, for example, heating systems based on geothermal energy are being subsidised. In the case of Sweden, the heat pumps, and other clean heating systems are indirectly supported through taxes on fossil fuels.

DHC systems powered by renewable energy are another important clean heat solution. If available, DHC systems enable the decarbonisation of the heat supply of a large number of consumers. Nevertheless, only 6 of the 12 countries indicate the existence of support schemes in their countries, with Hungary, stating that subsidies are expected to be introduced through EU funding. Denmark incentivises the switch to DHC systems indirectly, by only making heat pump subsidies available, if there is no availability of a DHC system.

As indicated above, while most countries do provide public financial assistance to lower the initial purchase cost of heat pumps – and/or other clean heating systems - this support is often too limited, especially in countries with high operating costs, to make clean heating systems sufficiently attractive. Overall, 5 countries indicated full availability of public support for clean heat technologies, 7 have partial support or programmes are underway, indicating that most Member States provide some form of support. Crucially, most countries only subsidise the heating system itself and do not support other measures

⁹ Trinomics (2022). [Energy Prices and Costs](#), based among others on Eurostat data.

which are necessary to enable the building to operate with such a technology. As mentioned above, in the case of heat pumps only two survey respondents have indicated that financial support for upgrading the electrical system of a building to allow the use of a heat pump.

Regarding the availability of support for the most vulnerable households, the overall score dropped to only half the surveyed Member States providing support (6 Yes and 6 none). This is partially due to lack of national definitions for vulnerable households, and lack of clear communication of available support. Despite these incentives for clean heating, many countries, including Germany, Poland, Spain, Italy, and Sweden, continue to offer subsidies for fossil fuel heating, next to subsidies for clean heating. However, in several of these countries, particularly Germany, these subsidies were largely maintained during the energy crisis, and are intended to be phased out in 2024. However, deadlines for the phase out of fossil fuel subsidies in Germany were set for phase out in March 2024.

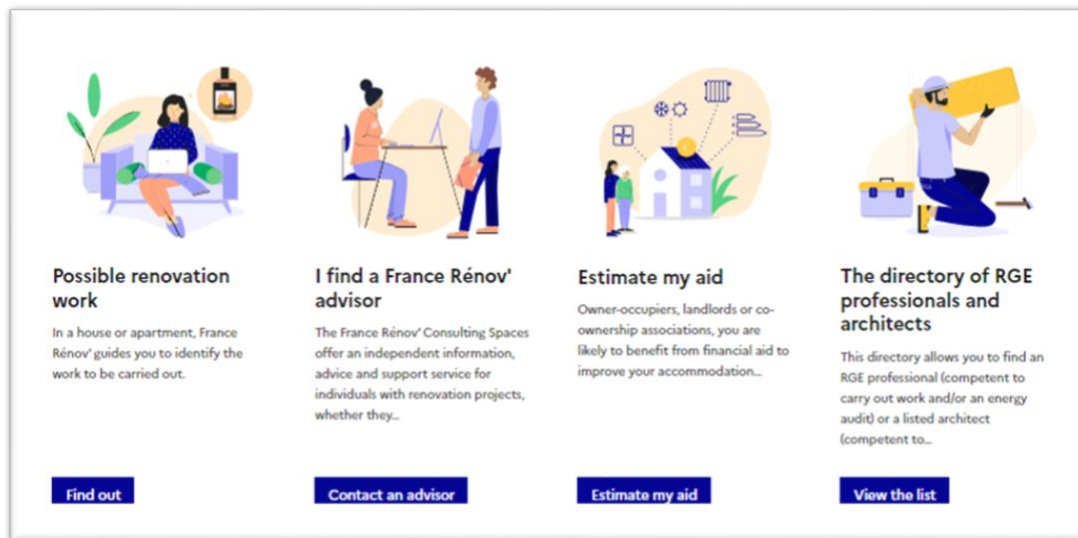
In the case where subsidies for both still exist, this creates a conflicting situation, with fossil fuel subsidies undermining the efficiency of the clean heating subsidies. Clear strategies for phasing out fossil fuel subsidies within the next five years are also not always evident in these cases. For example, in Croatia, the National Energy and Climate Plan and Long-term Renovation Strategies include declarative statements, but there are not yet supporting, binding documents.

Available support in France

France has a robust online and in-person system to inform and guide building owners through the available support mechanisms for clean heat, as well as other renovation measures. The website, France Rénov¹⁰ provides a wide variety of financial and practical information, including tailored information for single family homes and those in co-ownership.

¹⁰ France Renov <https://france-renov.gouv.fr/renovation/chauffage>

Figure 4 Screenshot of France Renov, translated by Google



The site also contains a directory for building owners to find their local one-stop-shop or other regional information provider to advise on potential solutions.

Financially, the French government offers robust support based on household size and income level. Values and income ceilings are clearly defined and communicated on their website, as well as other eligibility requirements, like the type of applicable works. While all information is available online, there is also an application guidance support, as well as an online step-by-step guide for applicants.¹¹

¹¹ Guide pas à pas à destination des demandeurs, MaPrimeRenov, <https://www.anah.gouv.fr/anatheque/guide-pas-pas-destination-des-demandeurs-maprimerenov>

3.3. Addressing the barriers to clean heat deployment

The questions and response per MS were as follows:

No	Question	Croatia	Czechia	Denmark	Finland	France	Germany	Hungary	Italy	Lithuania	Poland	Spain	Sweden
13	Is there a requirement for local or regional authorities to develop local heating and cooling transition plans (in relation to the EED recast Article 25.6) and does this include a supportive framework that allows local authorities to do so? Is there a population threshold for local or regional authorities to perform this requirement?	No	Yes	Yes	Yes	Yes	Partially	No	Yes	Yes	No	Under development	Yes
14	Are there dedicated training programmes to upskill clean heating professionals (heat pump installers, electricians, solar energy installers, etc)?	Yes	No	Yes	Yes	Yes	Yes	Partially	Yes	Yes	Partially	Yes	Yes
15	Has the government introduced provisions to ease and accelerate the relevant administrative procedures for clean heat? This includes the connection to district heating, the installation of a heat pump, an increase of the power capacity for the electricity connection, the installation of rooftop solar and/or residential batteries. (examples include removal or reduction of spatial planning requirements or charges, licensing charges, connection charges, etc).	No	No	Partially	Under development	No	Yes	No	Yes	Yes	No	Partially	Yes
16	Are there barriers (e.g., high charges) for consumers who want to disconnect from the gas grid? Barriers include high charges, disconnection costs, a requirement to continue to pay standing charges.	No	No	Yes	No	No	0	0	No	Partially	No	Yes	No
17	Are flexibility schemes available to market demand-side flexibility via clean heating in response to signals from the public grid?	No	No	Yes	Partially	No	No	Yes	Yes	Yes	No	No	No
18	Has the government communicated the value of using flexibility (both electrical and thermal) to the general public? Flexibility is the ability to adjust supply and demand to achieve that energy balance, this includes storage solutions and demand response, and demand response aggregation.	No	No	No	Partially	No	0	0	Yes	Yes	No	Yes	Yes

With regards to efforts to address other national obstacles to clean heat adoption, the overall picture is varied but relatively optimistic. More than half of the nations assessed, including Czechia, Denmark, Finland, France, Italy, Lithuania, and Sweden have already mandated local/regional authorities to formulate local heating and cooling plans for municipalities with a population greater than 45,000, in line with the revised Energy Efficiency Directive (EED) Article 25.6.¹² For the rest of the countries, such planning is underway. The majority of the countries offer specialised training programmes to enhance the skills of professionals in the clean heating sector. Nonetheless, one significant and ongoing challenge is the protracted and complex administrative processes for clean heat installation, which half of the countries recognise as a continued problem.

Italy's Municipal Energy Planning

Prior to the recast of the Energy Efficiency Directive (EED), Italy's legislation was already directing local and regional bodies regarding national plans. The thirty-year-old Law 10/1991 introduced the Municipal Energy Plan (Piano Energetico Comunale, or PEC), a compulsory instrument for cities with populations exceeding 50,000. The PEC's role is to conduct a comprehensive assessment of a city's energy requirements. Its goals are to determine the energy consumption profile, plan for energy savings, and increase the use of renewable energy sources. The benefits of such planning include better environmental protection through reduced fossil fuel use and lower greenhouse gas emissions.

The PEC is designed to fit the local context while considering the prevailing social and economic factors. Crafting a PEC is a multifaceted task that demands collaboration across various disciplines. It must bridge the gap between economic considerations, ecological sustainability, technological advances, and the roles of public and private sectors in relation to energy resources. The goal is to create conditions favourable to an energy system that prioritizes renewable energy and conservation as a means to enhance environmental protection.

The plan examines the unique aspects of the local energy landscape and sets sustainability targets that align with broader strategic urban planning tools, like the Territorial Government Plan (PGT). These targets focus on reducing energy consumption, cutting emissions of climate-altering gases, and specifying the necessary steps to achieve these aims.

The PEC's core operational goal is to provide a detailed understanding of the local energy system and its environmental impact. This enables the identification of planning initiatives, assessment of untapped energy potential within the area, and advancement of the strategic energy policy goals set by the municipal government.

¹² Energy Efficiency Directive, 2023 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023L1791>

Some municipalities have taken the initiative to share their approaches to implementing the PEC on their websites, making these strategies accessible to the public and fostering transparency.

Local and regional energy plans in Lithuania

The 2023 amendment to the Heat Law introduced two levels of required planning documents, (1) the special heat plan prepared by municipalities, and (2) the 10-year investment plan prepared by district heating companies. These documents should include a detailed outline for the development, as well as modernisation of heat supply systems in the municipality.

As mandated in the Renewable Energy Law, each municipality must establish an Action Plan for the Development of the Energy Use of RES for the period 2021-2030. The plan should include an assessment of the current energy situation and set the goals and a roadmap to achieve these regional as well as national goals. The national goal being the average share of RES energy must be at least 32.7 % of total final energy consumption; in 2023-2025 - 36.5%; in 2026-2027 - 39.8%.

On a country-by-country basis, Lithuania, Finland, France, and Germany exhibit positive conditions in their approach to clean heat implementation, with scores between 63-73% (with Lithuania scoring highest). Finland is advancing in its efforts to eliminate fossil fuels and their subsidies and is actively providing information and financial support for clean heat initiatives. Germany and Italy have scored highly in this assessment, though the overall cost-effectiveness of clean heat remains a barrier in these nations. Lithuania stands out as a leader across various measures, yet there is room for improvement in providing clear support and communication regarding phase-out timelines and assistance.

Hungary, Poland, Croatia and Czechia lag behind in their clean heat implementation efforts. All three countries lack concrete or apparent plans for phasing out fossil fuels. Croatia and Hungary in particular lack information on, and awareness raising efforts on clean heat solutions and have partial to no support for installing clean heat or for incentivising smart heating solutions (such as heat pumps plus solar solutions). Neither of the three countries have introduced provisions to ease the administrative burden of implementing clean heat.

	Croatia	Czechia	Denmark	Finland	France	Germany	Hungary	Italy	Lithuania	Poland	Spain	Sweden
Overall score on clean heat implementation	42%	42%	55%	71%	63%	63%	26%	55%	76%	34%	50%	55%

There are a wide range of scores across the Member States surveyed, with an overall average score of 52% - see Chapter 2, Methodology for scoring information. Lithuania and Finland scored the highest with scores of 76% and 71% respectively, followed by France – 63%, Germany- 63%, Denmark- 55%, Italy – 55%, and Sweden- 55%, tailed closely by Spain – 50%, and Croatia – 42%, Czechia – 42%, Poland – 34%, and Hungary – 26% showing the least progress. However, factoring in all the “partially” and “under development” responses, in 1-2 years, this status could be quite different. If all the partial and under development measures are put into place, the collective average would increase to 63%. Out of the top 5 countries with the highest share of DHC (Denmark, Finland, Lithuania, Poland, Sweden), 5 of them (Finland, Sweden, Denmark, Germany, and Lithuania) has more than 55% scoring in the result.

4. Case studies – a deeper look

We have included three case studies to provide a deeper look at their current and planned policies, as well as the overall national context. Germany, Italy, and Poland have been selected based on their current potential and deployment of clean heat, to represent a range of MS positions/situations and the robustness of their survey response.

With regards to heating subsidies, Germany is among the top three countries in the EU providing subsidies for heating technologies – with the majority of support for future proof technologies. Germany has ceased its backing for fossil fuel-based heating, phasing out final subsidies in 2024, and has amended the Building Energy Act (Gebäudeenergiegesetz) which entered into force on the 1.1.2024.¹³ Conversely, despite providing subsidies for renewable heating technologies, Italy and Poland, as two significant markets, have not yet indicated moves toward reducing their financial and political support for fossil fuel heating.¹⁴

Regarding implementation of clean heat technologies, Poland has a relatively high share of district heating, with a 42% market share.¹⁵ Germany is in the middle at 14%, and Italy among the lowest in the EU at 2%.¹⁶ Concerning heat pump implementation, in Germany, heat pump sales increased significantly in 2022, with over a 50% increase in sales to 270,000. However, gas and oil boilers remain as the majority share of the market.¹⁷ In Poland heat pump rollout is speeding up, with 210,000 heat pumps sold in 2022 compared to 98,000 in 2021.¹⁸

4.1. Germany

Overview national heating energy use and sources (including heat pumps and DH), as well as barriers

In Germany heating demand is mainly supplied by natural gas (43%) and oil products (13%). Biomass (11%) and electricity (20%) are also important heat sources, while heat pumps (2%) and solar thermal (2%) have only a minor contribution (see Figure 1).¹⁹ In addition, around six million households are served by district heating (approx. 12 million people), representing 14% of all heating technologies nationally. Regarding new residential buildings, as of 2021, district heating accounted for 18.5% of the market share, after heat pumps with 48.5%, and natural gas with 25.8%.²⁰ Germany is among the top three countries providing subsidies for heating solutions.²¹

Even though heat pumps have witnessed exponential growth throughout 2020 to 2023, the tax ratio between electricity and gas is highly unfavourable to electricity. Specifically,

¹³ [BMWSB - Gebäudeenergiegesetz \(bund.de\)](https://www.bmwsb.de/germany/germany-energiesubsidy-overview)

¹⁴ https://www.coolproducts.eu/wp-content/uploads/2023/07/Mission-Possible-Briefing_EEB-Coolproducts-1.pdf

¹⁵ Note that most district heating in Poland can only support high temperatures and are connected to coal-based electricity generation plants.

¹⁶ Euroheat & Power's 2023 Market Outlook, <https://www.euroheat.org/>

¹⁷ <https://europeanclimate.org/wp-content/uploads/2023/04/heat-pumps-summary-report-ehpa-ecf.pdf>

¹⁸ EHPA (2023). Summary EHPA 2023 Heat pump market report.

¹⁹ Eurostat data for 2021 for Germany

https://ec.europa.eu/eurostat/databrowser/view/NRG_D_HHQ__custom_9376222/default/table?lang=en&page=time:2021

²⁰ Euroheat & Power's 2023 Market Outlook, <https://www.euroheat.org/>

²¹ https://www.coolproducts.eu/wp-content/uploads/2023/07/Mission-Possible-Briefing_EEB-Coolproducts-1.pdf

for one megawatt hour of electricity roughly 407€ of taxes have to be paid, whereas for one megawatt hour of gas only 65€ are collected. Consequently, the German Heat Pump Association is expecting a stagnation or even a decline of newly installed devices as consequence.²² Current goals and timelines

Germany has a goal for climate neutrality by 2045. The EU Directives (and their proposed targets and timelines) such as the Energy Efficiency Directive, Energy Performance of Buildings Directive, and Renewable Energy Directive, are transposed into German legislation. The Building Energy Act (Gebäudeenergiegesetz, GEG) regulates the clean heat transition in combination with the heat planning act (Wärmeplanungsgesetz). The current GEG requires 65% of the heat to come from renewable sources for buildings, with an overall phase out of fossil fuel heating by 2045.²³

- According to the BMWK, Federal Ministry for Economic Affairs and Climate Action of Germany, it is mandatory to replace heating systems after 30 years. In addition, oil and gas heaters have to be replaced by 2024, 2026 or 2028. Further, if an old heating system cannot be repaired there is a transition period of 5 years in which fossil heating may be used.

Obligations for clean heating differ for existing and new buildings; the location of the building and based on whether the local government has issued a Kommunale Wärmeplanung (communal heat plan). These plans need to be prepared for cities above 100.000 inhabitants by 30/06/2026 (and by 30/06/2028 for the rest of the municipalities). The Heat Planning Act (WPG), which entered into force on 01/01/2024, includes the requirements for local heat planning explained above. Given that all German municipalities must formulate a heat plan by 30/06/2028, the WPG exceeds the population threshold requirements in Art. 25(6) EED. Many German cities have indeed just finished their heat plans, see attached input sheets for more information.

Support measures available for switching to clean heat – information and financing

In Germany, technical support and assistance available to advise consumer's choices differs by federal state. Generally, large support comes from the Verbraucherzentralen (consumer centre) which has branches in all federal states (in total 900 branches).

In terms of supporting awareness and information sharing, campaigns can be partially subsidised by the government. The BMWK and BMWSB have launched campaigns, while the Greens had campaigns on social media. Currently, households have different levels of information regarding switching to clean heating, given that §112 GEG defines different requirements for EPCs resulting in a situation where households have different information on the energy performance of their buildings.

In terms of dedicated training programmes to upskill clean heating professionals (heat pump installers, Geothermal well drillers, electricians, solar energy installers, etc.) there are several training initiatives, e.g. for heat pumps or for recommendations for wind power jobs by the BMWK. However, the infamous Fachkräftemangel is affecting several of these jobs.

²² [Rekordabsatz: Wärmepumpenbranche beweist Leistungsfähigkeit trotz unsicherer Aussichten | Bundesverband Wärmepumpe \(BWP\) e.V. \(waermepumpe.de\)](https://www.waermepumpe.de/Rekordabsatz-Waermepumpenbranche-beweist-Leistungsfaehigkeit-trotz-unsicherer-Aussichten-|-Bundesverband-Waermepumpe-(BWP)-e.V.-(waermepumpe.de))

²³ BMWK, Building Energy Act (GEG), Accessed January 11th, 2024, <https://www.bmwsb.bund.de/SharedDocs/topthemen/Webs/BMWSB/DE/GEG/GEG-Top-Thema-Artikel.html;jsessionid=10BAFE5A69DECBC63BF4DB2A9D69B2AA.live861>

In terms of financial government support, heating replacement is an applicable measure under the *Federal Funding for efficiency individual building measures* (BEG-EM).²⁴ Citizens can already purchase updated heating solutions and submit their financial application later, if it is before November 30, 2024. Several other subsidies are available including 30% subsidy for heating replacement in residential and non-residential buildings. A 20% bonus by 2028 for early replacement of old fossil fuel heating systems, an income subsidy of 30% for owner-occupiers with taxable income under 40,000 euros annually. All subsidies can be accumulated to a maximum of 70%. The same subsidy programme also offers support for the connection to DHC systems. For a new connection 30% of the investment costs are reimbursed, with an additional bonus of 20% if it is being done before 2028. For vulnerable households this early mover bonus is increased to 30%. The required share of renewable energy and/or waste heat to be eligible for the subsidy depends on the specific circumstances.²⁵

While there is no funding specifically for photovoltaics in combination with heat pumps (i.e. smart combinations of clean building solutions), there are the well-known subsidies for photovoltaics and there are extensive subsidies for heat pumps. There are also subsidies for solar heat. However, whilst there are certain subsidies for building technology ("Anlagentechnik"), these do not include support to upgrade the electrical system of a building to enable heat pump or PV use.

Subsidies also exist for the operators of DHC systems to upgrade their network to enable the integration of low temperature heat sources.²⁶ These subsidies are not strictly targeted at lowering the operation temperatures. Instead, they focus on the decarbonisation of the system, which frequently aligns with a temperature reduction, as renewable heat sources often have a lower supply temperature. Across all three steps of this subsidy programme more than 200€ million can be invested in a single DHC system.

However, it is important to note that currently there are also subsidies available for fossil heating, particularly in the context of the current energy crisis. During the energy crisis, Germany reduced the VAT for gas, electricity and district heating temporarily from 19% to 7%. Moreover, a heat price cap was introduced for gas and district heating. This means indirect subsidies for fossil fuels, but these subsidies directly helped affected customers during the crisis. The parliament issued a commentary on the height of these subsidies. The most recent subsidy report of the finance ministry mentions that a climate-friendly design of the financial and tax framework also includes the further reduction of environmentally harmful subsidies.²⁷ Therefore, both measures will be phased out in early 2024.

In terms of specific support for the most vulnerable households for clean heating, there is support for the construction of balcony PV and cooperation with other EU MSs to build the capacity of local administrations to take the necessary measures in this regard.

²⁴ Federal funding for efficient building (BEG), BMWK, Accessed January 14, 2024, <https://www.energiewechsel.de/KAENEFF/Redaktion/DE/Dossier/beg.html>

²⁵ *So fördern wir Ihre neue Heizung | KfW*

²⁶ *Förderdatenbank - Förderprogramme - Bundesförderung für (foerderdatenbank.de)*

²⁷ *Bundesministerium der Finanzen (2023). 29. Subventionsbericht des Bundes 2021 – 2024.*

4.2. Italy

Overview national heating energy use and sources (including heat pumps and DH), as well as barriers

In Italy, heating demand is mainly supplied by natural gas (53%) and oil products (6%). Biomass (20%) and electricity (18%) are also important heat sources, solar thermal (1%) and district heating (2%) have only a minor contribution.²⁸ There are no major barriers to switch from natural gas heating system to heat pumps, or DHC, even though the assimilation of heat pumps is less than 1% in Italy. In addition, only about 2.3% of total residential heating is covered by district heating, and DHC networks are almost entirely located in the northern part of the country. However, annual growth has remained constant at 3% annually over the past 4 years.²⁹ Similar to Germany, Italy is also among the top three countries providing subsidies for heating solutions.³⁰

Current goals and timelines

Goals and timelines are under development in Italy. The EU Directives such as EED, EPBD and RED are transposed into Italian legislation, namely the previous EED II was transposed with Legislative Decree 73/2020, and RED II with Legislative Decree 199/2021. Timelines as set out in these directives are also applied in Italy. Moreover, EPBD III is implemented with Legislative Decree 48/2020. From 01/01/2021 all newly built buildings or those undergoing demolition and reconstruction must be NZEB, which clearly has no allowance for fossil fuels anymore, also excluding gas boilers. The obligation had already been realized for public buildings as of 31/12/2018.

Italy has over 12 million residential buildings and nearly 32 million dwellings. The annual retrofitting rate is to increase from 2% in 2030 to 2.6% in 2050, according to the roadmap of Ministry for Ecological Transition.³¹

Prior to the EED recast, as early as in 1991, Law 10/1991 introduced the need for the Municipal Energy Plan (PEC). The purpose of the PEC, which is mandatory for municipalities with more than 50,000 inhabitants, is to primarily to identify the city's energy needs, but it also includes interventions aimed at energy saving and developing renewable energy sources (RES). Hence, the PEC is developed in line with the strategic urban planning tools, namely the Territorial Government Plan (PGT). Hence, the development of the PEC is already a requirement for more than 30 years, even though is focusing more generally on the energy needs as a whole and not directly focused on the transition to clean heating and cooling. Some municipalities have published their ideas for implementing the plan on their website.³²

Various subsidy schemes, such as Superbonus and Ecobonus (see below for more details), support the installation of heat pumps and solar PV systems, installation of which is gradually increasing in residential houses in Italy. This can be considered as a provision in Italy to promote the transition to clean heat. A major barrier for installing heat pumps in

²⁸ Eurostat data for 2021 for Italy

https://ec.europa.eu/eurostat/databrowser/view/NRG_D_HHQ__custom_9211076/default/table?lang=en&page=time:2021

²⁹ Euroheat & Power's 2023 Market Outlook, <https://www.euroheat.org/>

³⁰ https://www.coolproducts.eu/wp-content/uploads/2023/07/Mission-Possible-Briefing_EEB-Coolproducts-1.pdf

³¹ STRATEGY FOR ENERGY RETROFITTING OF NATIONAL BUILDING STOCK, Ministry for Ecological Transition, 2021, https://energy.ec.europa.eu/system/files/2021-12/2020_ltrs_italy_-_en.pdf

³² For example: <https://www.comune.prato.it/it/vivere/ambiente-sostenibile/piano-energetico-comunale/pagina1003.html>
<https://www.capiasca.ch/Piano-energetico-comunale-PECo-57db1a00> <https://www.lugano.ch/temi-servizi/energia-ambiente/energia/piano-energetico-comunale/>

Italy is that the standard electricity connection is around 3 kW,³³ which is insufficient. An application will need to be done to increase this connection capacity which will slow down the readiness to install a heat pump. However, there is no subsidy for District Heating (DH) and residents decide on connecting to a DH system depending upon availability and the information that DH Operators provide.

Support measures available for switching to clean heat – information and financing

There is no direct *technical* support for switching to clean heat solutions, this is left to the free market in Italy. Information about the energy label of a house is available, which comes into play during rental agreements and sales of the house/apartment.

There are incentive programmes in place that encourage energy efficiency improvements including clean heat solutions. These are Superbonus, Ecobonus, Conto Termico, among others:

- Tax deduction for the purchase of furniture and home appliances,
- Tax deduction on building retrofit measures (Ecobonus),
- Tax credit for heating systems through biomass and geothermal energy,
- Thermal Account (Conto Termico)
- Superbonus is covering 110% of eligible expenses until end of 2023, 70% in 2024 and 65% in 2025.³⁴
- VAT reduced for electricity, gas and DH supplies: this support scheme is temporary and was introduced for deal with energy crisis.

The purpose of these subsidy schemes is to increase the energy efficiency of the building. These schemes also subsidize certain types of hybrid solutions, such as

- Electric- or gas-based Heat Pumps in combination with solar PV.
- Heat Pumps in combination with gas boilers.
- Investments in building insulation (wall insulation, new windows, roof isolation) in combination with Heat Pumps.

Unfortunately, these subsidy schemes also allow for fossil-based heat systems, which are therefore also subsidized. Moreover, there is no plan to phase out these fossil-based subsidies.

There is a support for the most vulnerable/energy poor residents for paying their energy costs for electricity and gas consumption, also including district heating and cooling (DHC) in recent years. However, this does not include support for the transition to clean heat.

There are specific requirements and obligatory training needs for professionals in the energy sector, namely technicians need to pass an exam to obtain the title of "Energy Certifier." The same obligation applies to Energy Managers and energy Auditors (UNI CEI 11339).³⁵

³³ See for instance <https://www.angloinfo.com/how-to/italy/housing/setting-up-home/electricity>

³⁴ The Superbonus is governed by Article 119 of Decree Law no. 34/2020 (Relaunch Decree), which consists of a deduction of the expenses incurred for the implementation of specific interventions aimed at energy efficiency and static consolidation or the reduction of the seismic risk of buildings. Moreover, the installation of photovoltaic systems and infrastructure for the charging of electric vehicles in buildings is also included. <https://www.agenziaentrate.gov.it/portale/web/guest/superbonus-110%25>

³⁵ See for instance: <https://www.interregeurope.eu/good-practices/uni-cei-11339-italian-certification-scheme-for-experts-in-energy-management>

4.3. Poland

Overview national heating energy use and sources (including heat pumps and DH), as well as barriers

While Poland has made some significant recent gains, there remains potential for clean heat nationally, which is essential for overall energy security nationally. With an unfavourable price ratio, and continued support for fossil fuel subsidies in heating, a transition to clean heat remains challenging. However, in recent years, Poland has become one of the front runners in heat pump installation. From 2020 to 2021 heat pump sales grew 67%, totalling over 93,000 units sold.³⁶ In 2022, air-to-water heat pump sales increased by 131%.³⁷ However, there are potential skilled labour shortages that could impact this growth. Additionally, while Poland has the second highest capacity of installed district heating in the EU, district heating and cooling account for 42%,³⁸ yet still 86% of the fuel supply is from coal, gas, or oil.³⁹ Therefore, while on the positive side, Poland is working toward a clean heat transition, there is still significant room for improvement.

The two key strategies outlining the transformation of the heating sector in Poland are the National Energy and Climate Plan for 2021-2030 (NECP), and Poland's energy policy until 2040 (PEP 2040).⁴⁰ While there is no current local or regional requirement for authorities to develop heating and cooling transition plans, regional plans are foreseen with the implementation of the revised Energy Efficiency Directive.

Current goals and timelines

The PEP is the main document outlining the direction of clean heat in Poland for the near-term (until 2040) and while the government has not agreed on a timeline for phasing out fossil fuel heating, there are plans partially in place to phase out the installation of fossil fuel only boilers in new and existing homes. According to the PEP, by 2040 the heating needs of all households are to be covered by system heat and by zero-emission or low-emission individual sources. The main individual heating solutions will be heat pumps, solar collectors and electric heating.⁴¹

Poland foresees a significant increase in installed PV capacity (5-7 GW by 2030 and approximately 10-16 GW by 2040). This will enable the low-cost use of electricity for heat pumps and natural gas (as a transition fuel).⁴²

To accelerate district heating, there is an obligation for new buildings to connect to the heating network, given it is economically and technical feasible. Conditions for connecting to the heating network must be considered when applying for new building construction. The lack of consideration of connection could result in permit denial.⁴³

³⁶ *Cleaning up heat: The changing economics for heat pumps in Poland*, RAP, November 2022, <https://www.raponline.org/wp-content/uploads/2023/09/rap-gibb-morawiecka-poland-heat-pump-tco-2022-nov.pdf>

³⁷ Port PC, Accessed January 16, 2024, <https://portpc.pl/ponad-dwukrotny-wzrost-sprzedazy-powietrznych-pomp-ciepla-w-i-pol-2022-roku/>

³⁸ Euroheat & Power's 2023 Market Outlook, <https://www.euroheat.org/>

³⁹ <https://op.europa.eu/en/publication-detail/-/publication/4e28b0c8-eac1-11ec-a534-01aa75ed71a1/language-en>

⁴⁰ <https://www.gov.pl/web/klimat/cieplownictwo-i-kogeneracja>

⁴¹ <https://www.gov.pl/web/klimat/cieplownictwo-i-kogeneracja>

⁴² <https://www.gov.pl/web/klimat/cieplownictwo-i-kogeneracja>

⁴³ Ustawa Prawo Budowlane - Construction law

Support measures available for switching to clean heat – information and financing

Support measures offered in Poland to help guide the switch to clean heat are mixed. In terms of technical assistance, the Clean Air Programme provides an online platform called the Energy Efficiency Expert Platform. It is a tool that helps connect individuals with experts in the field.

Additionally, under the "National Advisory Support System for the Public, Housing, and Enterprise Sectors in the Field of Energy Efficiency and Renewable Energy Sources," orchestrated by the National Fund for Environmental Protection and Water Management, there is a programme to appoint an "Energy Advisor" in each municipality. The programme supports trainings for these officials. The Advisors would serve as a free point of contact for locals, a one-person one-stop-shop. The programme is not mandatory, and therefore the appointment of municipal Energy Advisors is the responsibility of the local authorities.

In terms of training and upskilling, the lack of skilled professionals to install heat pumps, along with concerns about the quality of heat pumps and their installation, could significantly hinder the wider adoption of this technology. A recent special competition was announced by the Ministry of Economy and Labor to create an Industry Skill Centre, "Creation and support of the functioning of 120 Industry Skills Centres (BCU)," financed by the national recovery plan. The aim is to establish Training Centres with government funding, to which industry associations may apply.

PORT PC, the national association supporting heat pumps, entered the competition to create an Industry Skill Centre dedicated to heat pump technology. Plans for the coming years include the development of national standards for training programs, as well as the professional retraining of individuals to become qualified heat pump installers. This initiative is expected to lead to the establishment of the PORT PC Heat Pump Installer Academy, which aims to develop a comprehensive training system for heat pump installers in Poland. The goal is to establish over 100 Industry Skills Centres (BCU) by the end of 2024.

In terms of direct financial support, there are several available options, including support for solar PV, and heat pumps. Upgrades of electric installations to allow heat pumps and PV, upgrades of heating distribution to lower temperatures, solar thermal, connection to district heating and cooling, electrical storage, and integrated energy renovation efforts. This is a key best practice, as half of EU dwellings have obsolete electrical installations and Poland is one of the only countries explicitly offering support.⁴⁴ The solutions are covered by public support programmes, operated by the National Fund for Environmental Protection and Water Management - Narodowy (Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej, NFOŚiGW). Funding exists for households as well as district system operators.

For households, various other funds exist, including:

- The Clean Air Priority Program (Program Czyste Powietrze)⁴⁵ has funding available for households for various solutions including both clean and fossil heating (heat pumps, gas, electric, district, PV, solar thermal, renovation, upgrade heating distribution), differentiating across income blocks, but only for residential.

⁴⁴ <https://www.feedsnet.org/wp-content/uploads/2023/01/FEEDS-report-202002.pdf>

⁴⁵ <https://www.czystepowietrze.gov.pl/>

- The STOP SMOG Programme,⁴⁶ which is for those living in areas under the anti-smog resolution of the 2001 Environmental Protection Law. The programme supports the implementation of projects in single-family homes to replace and eliminate high-emissions heat sources.
- For multifamily homes, there is the Warm Housing Program (Ciepłe Mieszkanie), to support buildings with 3-7 apartments improve air quality, and reduce greenhouse gas emissions.⁴⁷
- The My Electricity Program (Moj Prąd) programme supports the purchase and installation of 2kw-10kw PVs with thermal or electrical storages at homes. However, the programme was planned in end in 2023, and the continuation is not certain.
- For heat pumps, the Clean Air Program provides co-financing for air and ground heat pumps in retrofit houses where exchange of old fossil fuel boiler is needed. My Heat Programme (Moje Ciepło) provides co-financing of air and ground heat pumps in new built houses and the My Electricity Program supports the purchase and installation of heat pump if the house is equipped with PV system.
- The Agro-energy programme (Agroenergia) support farmers with grants heat pumps, solar PV, wind generation, or hybrid installations.⁴⁸
- The Thermo-modernisation tax relief (Ulga termomodernizacyjna) provides tax deduction on total costs for renovations including heating source exchanging.⁴⁹

While there is no nationally established definition of vulnerable households, there is a definition of a vulnerable gas and electricity consumer. Financial support programs take into account households with the lowest incomes. Homes are eligible to receive an allowance if income does not exceed PLN 1526/person in a single-person household or PLN 1090/person in multi-person household.

⁴⁶ <https://czystepowietrze.gov.pl/inne-programy/stop-smog>

⁴⁷ <https://czystepowietrze.gov.pl/inne-programy/ciepłe-mieszkanie>

⁴⁸ <https://www.gov.pl/web/nfosigw/agroenergia-2021>

⁴⁹ <https://www.podatki.gov.pl/pit/ulgi-odliczenia-i-zwolnienia/ulga-termomodernizacyjna/>

5. Conclusion

The elimination of fossil fuels, underscored by clearly articulated deadlines included in national legislation, is critical for providing a transparent and clear roadmap for the adoption of clean heating solutions. In recent years this has been difficult due to measures in place to alleviate increased prices due to the energy crisis. Despite this, the technical assistance and advisory services available throughout the Member States is a testament to the ongoing commitment providing information on clean heat.

A potential area for improvement would be by incorporating necessary information and recommendations for clean heat into Energy Performance Certificates (EPCs) or through the adoption of renovation passports. These instruments can serve as valuable guides for property owners in upgrading their energy systems. Comprehensive information dedicated to clean heat is needed, including the availability of clean heat source (i.e., district heating), the status of the electrical installations, and the interoperability of systems. Support mechanisms must also take a holistic approach and not only support individual measures but also the related installation and works (i.e., electrical upgrades, heat distribution system), as well as optimal integration with interoperability and smart management. Additionally, it is vital to consider support mechanisms for economically vulnerable households. Ensuring that these households have financial means and access to the necessary technical expertise is essential for a just and equitable transition to clean heating solutions. Overall, cost remains a barrier, in particular taking into consideration the gas to electricity price ratio – therefore governments need to reconsider taxes and levies on electricity.

Annex 1

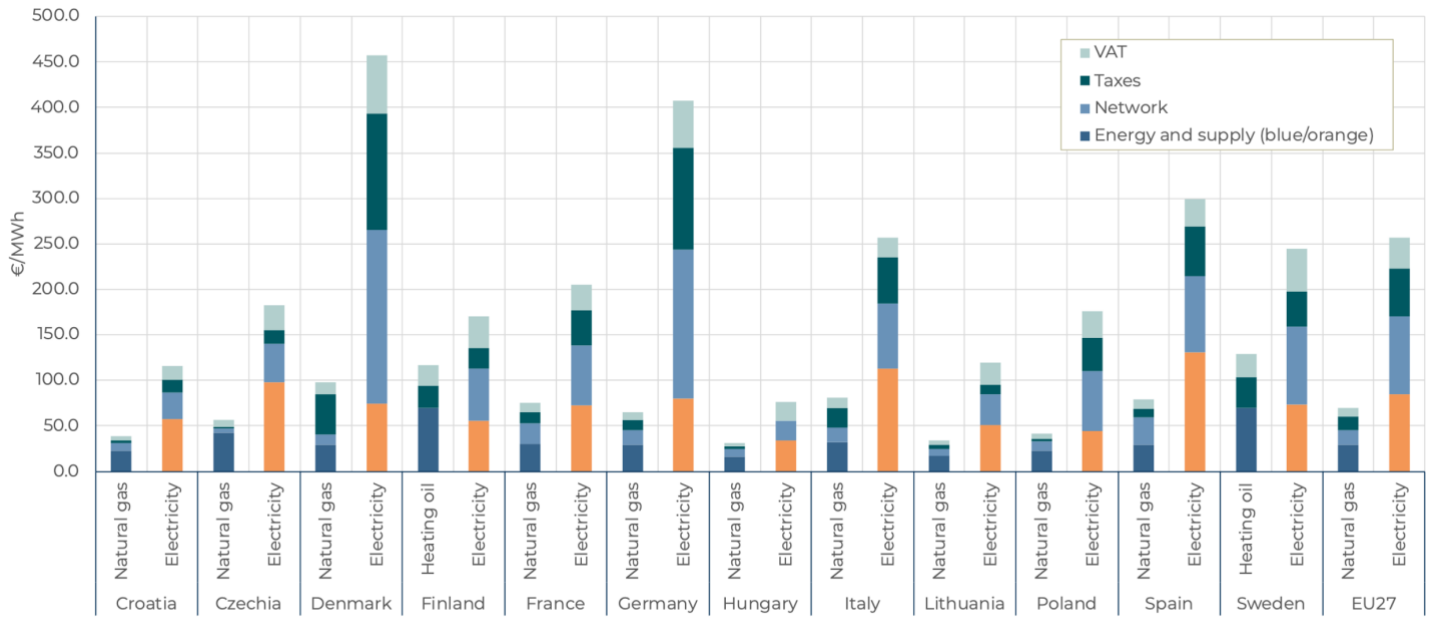
Survey questions used to gather insights from in-country experts to inform this study:

Subject	No	Question
Make clean heating the norm	1	Has the government agreed to a timeline for phasing out fossil heating?
	2	Has the government proposed or enacted legislation including end-dates for phasing-out the installation of fossil fuel-only boilers in new and existing homes?
	3	Has the government communicated timelines for the upgrading of the worst energy performing buildings? (For example, through minimum energy performance standards)
	4	Is individualised technical support and assistance available to support consumer's choices of existing solutions? (For example, via one-stop-shops, deep renovation support/guidance/financing)
	5	Separate from technical support, are there awareness and information sharing campaigns?
	6	Does every household have access to information about switching to clean heating, its available options and the necessary steps (via EPC or renovation passport)?
	7	Is there a requirement for clean heating technologies to be interoperable and remote-controllable?
Ensure that clean heating is affordable for all	8	Is the price ratio between gas, electricity, oil, and district heating supportive of a switch to clean heating? Please identify a source of (official) data for average consumer price for gas, electricity, oil and district heating. (For example, by moving taxes and levies away from clean heating or by implementing a carbon tax)
	9	Are there public financial support schemes for installing clean heating technologies? Support can be tax benefits (e.g., a VAT rebate), direct support of installation cost, subsidy on sale of produced energy, loan benefits (e.g., guarantees, favourable loans, etc.), accelerated depreciation
	10	Are support schemes available that specifically incentivise the smart combination of clean building technologies, i.e. heat pumps + solar?
	11	Are there currently subsidies for fossil heating? (For example, grants for new/replace oil/gas boilers, fuel subsidies, etc.)
	11b	If yes: is there a plan to end these subsidies in the next 5 [10? By 2030?] years?
	12	Is there specific support (see categories in Q9) for the most vulnerable households for clean heating, according to the MS definition? Include what the MS definition of vulnerable is.

Addressing the barriers to clean heating deployment	13	Is there a requirement for local or regional authorities to develop local heating and cooling transition plans (in relation to the EED recast Article 25.6) and does this include a supportive framework that allows local authorities to do so? Is there a population threshold for local or regional authorities to perform this requirement?
	14	Are there dedicated training programmes to upskill clean heating professionals (heat pump installers, electricians, solar energy installers, etc.)?
	15	Has the government introduced provisions to ease and accelerate the relevant administrative procedures for clean heat? This includes the connection to district heating, the installation of a heat pump, an increase of the power capacity for the electricity connection, the installation of rooftop solar and/or residential batteries. (Examples include removal or reduction of spatial planning requirements or charges, licensing charges, connection charges, etc).
	16	Are there barriers (e.g., high charges) for consumers who want to disconnect from the gas grid? Barriers include high charges, disconnection costs, a requirement to continue to pay standing charges.
	17	Are flexibility schemes available to market demand-side flexibility via clean heating in response to signals from the public grid?
	18	Has the government communicated the value of using flexibility (both electrical and thermal) to the general public? Flexibility is the ability to adjust supply and demand to achieve that energy balance, this includes storage solutions and demand response, and demand response aggregation.

Annex 2

Figure 5 Electricity, gas and heating oil retail prices for households in the 12 selected member states in 2021. Price is split in energy and supply (wholesale price), VAT, taxes and network tariffs.



Source: Eurostat (2022). [Gas/electricity prices for household consumers.](#)



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