Ramping up Heat Pumps in Moldova: A Roadmap

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Abstract

Buildings account for more than half of Moldova's final energy consumption, with three-quarters of that used for space and water heating. At the same time, Moldova lacks domestic hydrocarbon resources and imports more than 80% of its primary energy. Heat pump technology offers Moldova an effective means of accelerating the transition in building heating.

The recent expansion of Moldova's solar and wind capacity also means that heat pumps can now play a greater role in cutting greenhouse gas emissions and lowering local air pollution. Finally, Moldovan's 2024 referendum, endorsing the goal of European Union membership, underscores the country's commitment to European integration. Outlining an effective path to decarbonise energy use is a prerequisite for joining the bloc and heat pumps can play a central role in this.

Moldova faces several notable barriers to heat pump adoption including the high upfront costs of heat pump technology and installation, alongside limited industry experience. Public awareness and demand for heat pumps remain low, with many consumers deterred by cost and maintenance concerns.

This roadmap takes stock of the current landscape, draws on the experience of other countries and offers policy recommendations to spark a discussion and advance heat pump adoption in Moldova.

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Executive summary

Moldova's new National Energy and Climate Plan (NECP) lays out the country's ambition to improve energy efficiency, reduce fossil fuel demand and decarbonise its economy. Buildings account for more than half of Moldova's final energy consumption, with three-quarters of that used for space and water heating. Currently, these needs are met chiefly by imported natural gas and domestic biomass – two fuel sources that suffer from availability and sustainability issues. Heat pump technology offers Moldova an effective means of accelerating the transition in building heating. This roadmap discusses the status of Moldova's heating sector, the potential for heat pump deployment, and key policy recommendations for creating and maintaining a stable heat pump sector.

Strengthening energy security while improving efficiency, curbing natural gas use and working toward European Union accession

Heat pumps offer multiple benefits. By implementing the policy recommendations outlined in this roadmap, Moldova can build a heat pump sector that strengthens energy security, improves efficiency, lowers greenhouse gas emissions and air pollution, supports economic development and reduces energy poverty – all while advancing toward the goal of European Union membership.

Moldova lacks domestic hydrocarbon resources and imports more than 80% of its primary energy. Securing reliable natural gas and electricity supplies has long been its main energy security challenge. Replacing natural gas-fired heating technologies with heat pumps would improve the country's energy security. The recent expansion of Moldova's solar and wind capacity also means that heat pumps can now play a greater role in cutting greenhouse gas emissions and lowering local air pollution. Finally, Moldovan's 2024 referendum, endorsing the goal of European Union membership, underscores the country's commitment to European integration. Outlining an effective path to decarbonise energy use is a prerequisite for joining the bloc and heat pumps can play a central role in this.

Overcoming barriers to heat pump adoption

Moldova faces several notable barriers to heat pump adoption – many of which mirror challenges seen in countries with more mature markets. These obstacles include the high upfront costs of heat pump technology and installation, alongside limited industry experience and scale. The country's generally inefficient building stock risks blunting some of the benefits of heat pumps, since this can reduce

energy cost savings and strain Moldova's weak electricity grid. In rural areas, heavy reliance on low-cost, local biomass for heating poses significant risks to public health and the environment. Public awareness and demand for heat pumps remain low, with many consumers deterred by cost and maintenance concerns.

Additional challenges include high levels of energy poverty and a fragile electricity infrastructure, both of which must be addressed by any heating strategy. The thermal needs of urban and rural communities are also starkly different, so any heat pump rollout must account for this gap while avoiding increased hardship for vulnerable groups. Furthermore, there is a shortage of Moldovan technicians who have been trained in the installation and maintenance of heat pumps. All of these barriers are interconnected; addressing them early – guided by the policy recommendations in this roadmap – offers Moldova a strategic opportunity to accelerate progress.

Building a sustainable and equitable heat pump market

Our roadmap for scaling up heat pumps presents a phased strategy involving coordination across multiple ministries. Key policy actions scheduled to begin in 2025 for the Ministry of Energy (ENER) include developing a national heating and cooling strategy, clarifying the role of heat pumps in renewable energy targets, requiring local heating plans and updating the Renewable Energy Law. ENER also is tasked with adopting a long-term building renovation strategy and aligning the national energy performance rules with European Union directives. These early measures are critical to integrating heat pumps into Moldova's broader decarbonisation framework.

Communication and capacity building should be prioritised from the outset, with ENER taking the lead on initiatives like public awareness campaigns, training for government officials, and stakeholder platforms to foster dialogue between citizens and industry. Responsibility for market-building actions is shared across agencies: tax and regulatory adjustments are handled by the National Agency for Energy Regulation (ANRE) while the Ministry of Environment) (ENVI is charged with encouraging electrification and discouraging the use of fossil fuels. Meanwhile, Ministry of Infrastructure and Regional Development (MIRD) and ENER should promote the expansion of domestic manufacturing and installer training. Such coordinated efforts can help lower barriers for both consumers and the heat pump industry.

Beginning in 2030, the roadmap's focus shifts to regulatory measures. Moldova may wish to consider restrictions on fossil fuel heating systems in new and existing buildings, in line with the European Union's Energy Performance of Buildings Directive (EPBD). Longer-term measures include improved data collection by the National Bureau of Statistics and consideration of additional restrictions on

biomass in urban areas. Overall, the timeline reflects a gradual tightening of regulations alongside increased financial support to foster an environment conducive to widespread heat pump adoption.

This roadmap takes stock of the current landscape, draws on the experience of other countries and offers policy recommendations to spark a discussion and advance heat pump adoption in Moldova – a process that is just getting underway. Decisions on policy priorities and ministerial responsibility are left to Moldova. This roadmap is intended to inform the broader discussion on heat pumps among Moldovan policy makers and experts seeking to accelerate heat pump adoption.

Introduction

As Moldova looks to decarbonise its energy sector, heating represents both a critical challenge and a promising opportunity. Energy use in buildings consumes the largest share of total final consumption in Moldova at around 53%. Much is used for space and water heating, accounting for more than 40% of the country's final energy demand. Its current reliance on imported and carbon-intensive resources underscores the need for a transition to more sustainable and secure solutions. Although they currently play a negligible role, heat pumps – which use renewable energy to provide efficient heating and cooling – offer a pathway to address Moldova's energy and environmental goals while fostering economic growth and affordable energy.

With no domestic fossil fuel production of its own, Moldova's energy landscape is shaped by this reliance on imported natural gas and the widespread use of local biomass, particularly in rural areas. This poses unique challenges: natural gas imports are subject to geopolitical and economic risks, while unsustainable biomass use can contribute to ecological challenges and local air pollution. These factors emphasise the need for modern and sustainable heating technologies.

Heat pumps provide a wide range of services, from providing residential space heating, cooling and hot water to centralised heating for apartment blocks and district heating networks. Developing a robust heat pump sector could help Moldova reduce energy imports, improve energy efficiency, lower energy bills and stimulate local economic development and jobs through manufacturing and installation. A comprehensive policy framework that considers Moldova's overall energy strategy, communicates effectively with the public, supports the industry financially and delivers appropriate regulatory signals could provide Moldova with a secure, low-carbon heating sector.

Decarbonisation of the energy sector is a policy priority for Moldova and the country is taking proactive steps. Its National Energy and Climate Plan, approved at the end of February 2025, sets national targets for renewable energy, energy efficiency and greenhouse gas emissions. Heat pumps can support progress toward these targets, further advancing Moldova toward its broader goals for EU integration and accession.

The Moldovan government has taken recent note of the benefits of heat pumps, and this interest comes at an opportune time. Since 2022, energy challenges in the region have risen to the forefront. A significant dependence on natural gas from the Russian Federation (hereafter "Russia") has become an increasing vulnerability as hostilities have intensified. At the end of December 2024, Ukraine's

decision not to renew its gas transit agreement with Gazprom, the Russian state gas company, lead to a drastic reduction of gas supply to the breakaway region of Transnistria.[1] Located on the left bank of the Dniester River, Transnistria had historically relied on free Russian gas. It also is home to Moldova's largest power plant, which runs primarily on Russian gas.

This had notable political repercussions for Moldova, as residents of Transnistria faced a crisis: tens of thousands of people were left with no gas for heating or hot water and the country's largest power plant had to switch to temporary coal reserves to maintain electricity production. The country responded by securing alternative gas supplies and laid out a plan to lower energy demand by at least a third. It also devised a strategy to offset part of the electricity shortfall through purchases from Romania.

In recent years, Moldova has been gradually reducing its dependence on Russian natural gas, through projects such as a new pipeline to Romania. However, these efforts have largely focused on diversifying energy supply rather than reducing gas consumption – an endeavour that could be supported by improvements in energy efficiency and the development of alternative heat sources such as heat pumps.

As of the time of writing, the situation remains unresolved. However, the uncertainty of the past three years, and its role in fuelling domestic political tensions, is likely to reinforce the urgency for Moldova to reduce its reliance on Russian natural gas. This report explores how heat pumps can support this goal. The document was written primarily for Moldovan policy makers – at both the local and national level. However, it may be also of interest to other stakeholders within and outside the country. The report begins by describing the energy landscape in Moldova. It then details the benefits of heat pumps and their applicability in Moldova, followed by sections which explore the country's existing policy support for heat pumps and recommendations in terms of market, industry, finance and regulation. It concludes with a policy roadmap setting out priorities for the period from 2025 to 2040.

Heat pumps can help Moldova on many fronts. By reducing natural gas usage, they can improve energy security and lower greenhouse gas emissions. Supporting the development of the heat pump sector can provide jobs for Moldovans in installation, maintenance and manufacturing. Heat pumps, accompanied by measures to improve fabric efficiency (i.e. how well a building

[1] In this publication, the statistical data related to the energy sector refer to the Republic of Moldova without the breakaway region of Transnistria. Transnistria, a strip of land between the Dniester River and the eastern Moldovan border with Ukraine, is not recognised by the United Nations. The Moldovan government considers Transnistria to be a territorial administrative unit with a special status: a part of the Republic of Moldova but not controlled by its government.

retains heat), can also lower household heating costs, while reducing local air pollution linked to the burning of fossil fuels and biomass.

To achieve this vision, the report contains many policy recommendations for the short and long term. Three of these stand out as priorities for Moldova in 2025:

- **Address energy prices:** Narrow the electricity-to-gas price gap to make heat pumps more affordable and shorten the payback period.
- **Phase out fossil fuels:** Enforce performance standards in line with the European Union's Energy Performance in Buildings Directive to limit fossil fuel use in new buildings and set a phase-out date for installations of new fossil fuel boilers in existing buildings.
- **Plan for low-carbon heating:** Require local authorities to plan long-term heating and cooling in line with the European Union's Energy Efficiency Directive, designating zones for low-temperature district heating networks, upgrading existing networks for heat pump compatibility and installing air-source heat pumps.

Status and key indicators

The Republic of Moldova is a landlocked country, located between the northeastern border of Romania and the southwestern edge of Ukraine. Its surface area of 33 800 km^2 puts makes it roughly the same size as Armenia or Belgium. Moldova had a population of 2.45 million in 2023, a decline of 15% since 2013. Continued urbanisation amid this population drain presents important policy considerations for heating sector reforms. This chapter provides an overview of Moldova's energy policy framework, its energy targets and objectives, institutional governance and statistics on its heating sector.

Energy policy landscape

Governance overview

Moldova's energy sector is governed by several key institutions that collaborate to manage energy resources, production and consumption. The Ministry of Energy is the primary policymaking body, tasked with developing strategic energy policies to ensure energy security and sectoral development. Its National Centre for Sustainable Energy (NCSE) works to ensure the implementation of these policies, notably in the fields of renewables and energy efficiency. The NCSE also identifies and manages funds for energy efficiency and renewable energy projects, provides direct or co-financing for initiatives, and develops financing programs that combine external funds, state budgets and energy efficiency obligations.

The Ministry of Environment has a broad ecological remit to ensure energy policies align with sustainability goals, promote efficient energy consumption and support renewables. Moldova's regulatory authority in the energy sector is the National Agency for Energy Regulation (ANRE). It oversees market regulation and approves prices and tariffs for electricity, natural gas and district heating, as well as water and sewage.

The National Bureau of Statistics (NBS) is the country's main statistical body. It defines statistical methodologies, conducts national surveys and collects and processes data for Moldova's energy balance, which are shared with the International Energy Agency and Eurostat. The National Agency for Research and Development (NARD) oversees research and innovation policies, including European Union research programmes such as Horizon Europe. NARD supports energy-related initiatives by funding projects, fostering partnerships and promoting international collaboration to advance energy research and technology.

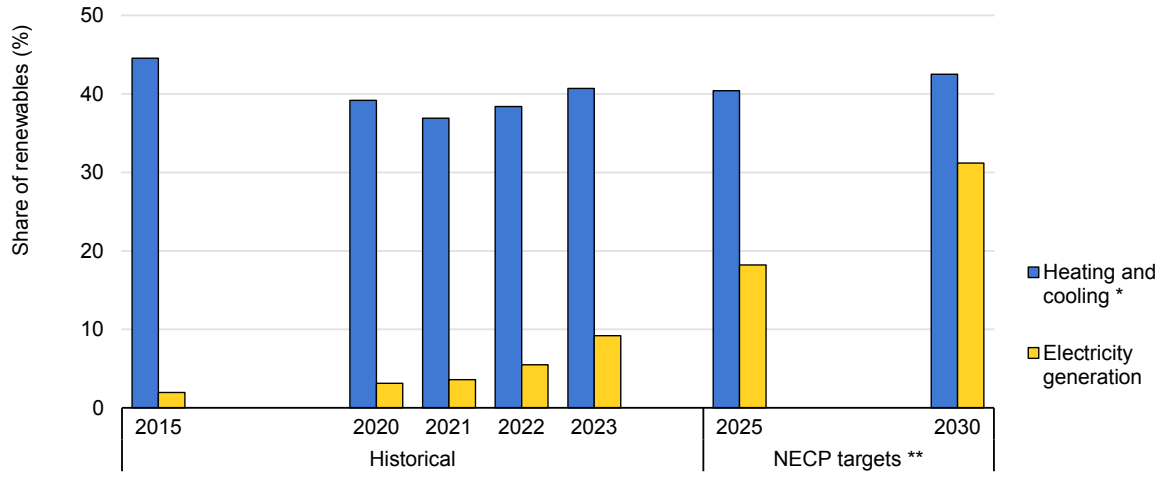
Energy strategy and objectives

Moldova passed legally binding legislation in April 2024 that commits the country to achieving net zero emissions by 2050. In addition to setting this target, Law No. 74 on Climate Action establishes a climate change commission to coordinate policies and public spending on adaptation and mitigation.

Moldova's Energy Strategy of 2030 had set several intermediate targets related to renewable energy, including renewable heat, up until 2020. The country's National Energy and Climate Plan (NECP, No. 86 of 26/02/2025), recently approved by Moldova's Cabinet of Ministers, has updated these objectives for 2030 and added additional targets.

These targets include achieving a 27% share of renewable energy in final energy consumption and slightly growing the share of renewable energy in heating and cooling to 42.5% of gross final energy consumption by 2030, with heat pumps contributing 2.3%. Currently, much of the renewable energy for heating purposes consists of solid biofuels. The NECP also identifies a financial need of USD 180 million for "Promotion of heat pumps in the Republic of Moldova".

Short assessment of renewable energy sources in Moldova's energy sector



*Share includes gross final consumption of energy for heating and cooling from renewable sources according to Article 7 in the Renewable Energy Directive.
** The targets of the NECP represent the levels reachable with planned measures (WPM).
Source: IEA based on data from Eurostat and Republic of Moldova.

Moldova's ambition on renewable electricity is more apparent. Its share in the NECP's planned policies scenario is expected to increase from around 9% in 2023 to 18.2% in 2025 and to 31.2% in 2030. Biomass production is expected to remain stable, though it is unclear which technologies can fill the gap – and to what extent.

Greater detail on the roles of specific technologies is needed, while explicit heat pump targets would provide clarity to the industry and public.

The NECP sets annual energy intensity targets for 2020 to 2030, followed by five-year targets until 2050. These include a 45% reduction in primary energy intensity (measured in units of energy per EUR) and a 27% decrease in final energy intensity by 2030.[2] Combined, these reductions should amount to a 75% decrease by 2050.

Sectoral energy efficiency targets for heating currently include modest goals, such as increasing residential space heating efficiency to 69% in 2030 from 66% in 2020. A broader deployment of heat pumps – which typically operate at 300-400% efficiency – could support a more ambitious target. The NECP also aims targets a 50% reduction in industrial energy intensity between 2020 and 2030, highlighting the need to reduce reliance on solid biomass – though without specific targets – and to cut absolute poverty levels by at least 50%.

The Moldovan government clearly recognises the benefits of heat pumps and their role in achieving their policy goals. Ground-source heat pumps have been identified as a "top priority" technology for adapting the energy sector to climate change. In addition, Moldova submitted a National Appropriate Mitigation Action (NAMA) in 2018, seeking support for implementing a project promoting heat pumps. Approximately USD 90 million was requested as a grant and USD 54 million as a concessional loan. Although, as of writing, it appears to have gone unfunded, it underscores the country's awareness of heat pumps to reduce natural gas consumption.

Renewable heating and cooling

Moldova's Renewable Energy Law prioritises expanding renewable electricity – namely wind and solar – while promoting efficiency in energy transformation, transmission and consumption. It transposes key EU legislation, like the Renewable Energy Directive (RED), defining terms and calculation methods for gross final consumption of renewables in heating and cooling, as outlined in Articles 23 and 24 of RED III.

Renewable energy is set to play a bigger role in district heating, given that the country requires 1.1 percentage-point annual increase in renewables share. However, the NECP also expects overall production of district heating to decline by a third, while residential energy demand will also fall significantly by 2050. Heat pumps have an opportunity to fill these gaps.

[2] According to Table 15 of the NECP, primary energy intensity falls from 0.33 kilotonnes of oil equivalent (ktoe) per EUR 1 000 in 2020 to 0.24 ktoe/1 000EUR in 2030.

A national heating and cooling strategy can help clarify the country's thermal demands and its available heat sources. It also can guide electricity grid expansion to support wider electrification through heat pumps and building renovations – both of which are key to minimising the cost of a large-scale heat pump rollout. Moldova lacks a national heat plan and a comprehensive study of its heating sector. It could look to Ireland's National Heat Study as a model. A World Bank study, which is not yet public, has started examining Moldova's heating and cooling landscape.

Energy efficiency in buildings

Amendments to the Energy Efficiency Law are expected to deliver annual energy savings of 0.8% from 2024 to 2030, based on 2019-2022 average consumption, thanks to measures included in the Government's Energy Efficiency Obligation scheme such as building renovations and support for new technologies. As previously discussed, the NECP lays out its high-level energy efficiency targets.

Moldova's Law on Energy Performance in Buildings mandates the consideration of alternative energy sources, such as heat pumps, in new building designs. In April 2024, new regulations were introduced to adapt to the European Union's updated Energy Performance of Buildings Directive (EPBD) from 2018, while in September 2024, Moldova adopted updated rules for energy performance certification. The country's legislative framework for building performance is thus comprehensive, yet a long-term building renovation strategy is still pending. As required by Article 14 of the EU Energy Efficiency Directive, Moldova has yet to complete an assessment of its potential for efficient heating and cooling.

Moldova also mandates high efficiency for electric appliances through its law 151/2014, which set Ecodesign requirements for energy-related products. This was further complemented by the country's law 306/2023 on efficiency labelling for energy-related products.

Future perspectives

Moldova has set itself on a path to join the European Union, with voters in October 2024 approving a constitutional amendment making accession to the bloc an official national goal. Moldova has adopted significant energy sector reforms to align with EU standards. Since joining the Energy Community – a group of countries pursuing energy sector reforms to support their bids for EU membership – in 2010, Moldova has made notable progress. As of 2024, it ranks among the group's top performers, having implemented 66% of energy reforms, compared to the 51% group average. Its strongest performance lies in the competence of its national authorities and in decarbonising the energy sector, while it lags in environmental improvements.

Moldova's recent push for closer integration with the European Union is evident in the signing of a EUR 310 million agreement with the European Commission to align the country's energy system with the EU market.

Energy in Moldova

Moldova lacks domestic hydrocarbon resources, highlighting the potential of renewables to reduce not only the country's greenhouse gas emissions but to strengthen its energy security. It has no domestic fossil fuels and imports more than 80% of its primary energy. Biomass has long been Moldova's sole domestic energy resource, yet over the past five years it has rapidly expanded its solar and wind capacity. Nevertheless, securing reliable and consistent gas and electricity supplies has been the country's biggest energy security challenge.

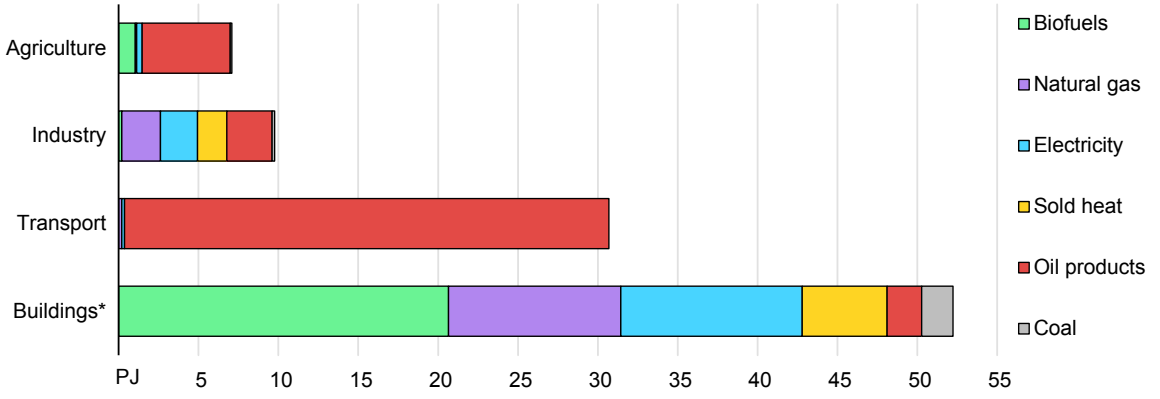
Moldova's main source of electricity is the MGRES power plant, a facility located in Transnistria that runs primarily on natural gas supplied by the Russian Federation. In past years, Transnistria has benefited from fossil fuels supplied by Russia at no cost. These fuels have been used to heat homes and businesses, power industrial processes and supply MGRES. Following Ukraine's refusal to renew its natural gas transit agreement with Russia, gas supplies to Transnistria were halted in January 2025. This situation has continued to evolve during the preparation of this report.

Moldova began its shift away from Russian fossil fuels in October 2021, when it started importing natural gas via Romania, ending its exclusive reliance on Gazprom. As a result, Moldovagaz – the former monopoly utility controlled by Gazprom – saw its market share drop from 98% in 2022 to 90% in the first quarter of 2024. Gazprom's deliveries to Moldovagaz stopped entirely in January 2025.

To bolster energy security and diversify energy supplies, additional steps were taken, including integrating the transmission network. Moldova, alongside Ukraine, synchronised its electricity grids with the main European network operated by the European Network of Transmission System Operators for Electricity (ENTSO-E). Commercial electricity flows between Moldova and ENTSO-E countries began on 30 June 2022, further diversifying Moldova's electricity supplies away from MGRES.

Energy use in buildings represents the largest share of total final consumption (TFC) in Moldova at around 53%, or 55.6 petajoules (PJ) in 2023. Building energy supply is dominated by biofuels and natural gas. The transport sector accounts for some 30% share of TFC – roughly 31.5 PJ in 2023 – almost entirely from oil products. Industry, agriculture and forestry round out the list with 17% in total, with energy use drawn largely from oil products, natural gas and electricity.

Total final consumption by sector and fuel in Moldova, 2023

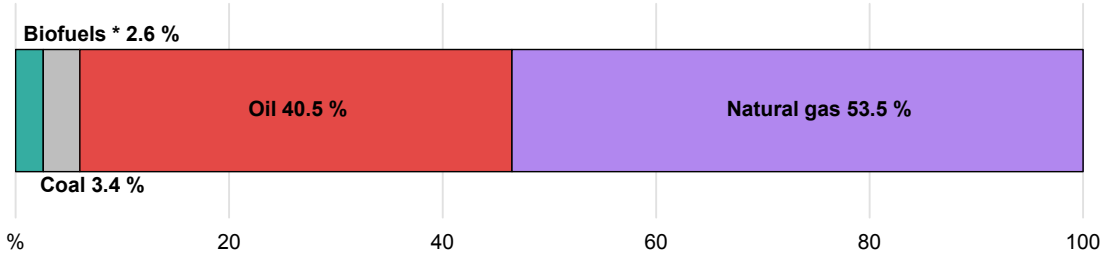


* Includes households, commercial and public services.
Source: IEA based on data from National Bureau of Statistics.

This highlights the importance of decarbonising and improving building performance to meet Moldova's climate and energy efficiency goals. The challenge is not just phasing out natural gas and heating oil in Moldova's buildings – it is also limiting the use of biomass which, when used unsustainably, poses health and environmental risks.

Emissions from Moldova's energy sector come chiefly from natural gas, most of which is burned in buildings, for cogeneration plants for district heating and for industry. Oil is also responsible for a large share of emissions, but it is used primarily by the transport sector.

Greenhouse gas emissions from combustion by fuel in Moldova, 2023



Notes: Includes only estimated CH_4 and N_2O emissions from biofuels.
Source: IEA (2025), Greenhouse Gas Emissions from Energy.

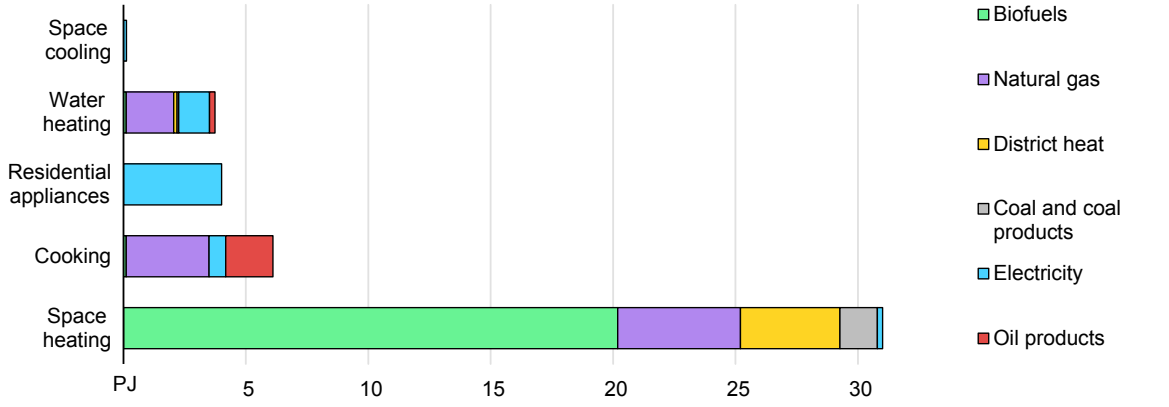
Heating in Moldova

Moldova's heating sector relies on a mix of imported fossil fuels and domestic biomass. Most heat is provided through individual building systems, with the rest from cogeneration plants fuelled largely by natural gas. These resources are either entirely imported (e.g. natural gas and heating oil) or depend on limited, largely unsustainable[3] biomass – Moldova's only domestic source of heating fuel.

In residential buildings, the bulk of the energy consumed (69%) is for space heating. This energy is derived mainly from biomass (65%), natural gas (16%) and district heating (13%). Electricity currently accounts for less than 1% of space heating in Moldovan homes, highlighting the still-minor role of heat pumps in the country.

Electricity accounts for a larger share of demand for water heating – around 34%. The remaining energy comes from a combination of natural gas (52%), oil products (6%) and district heat (4%). Air-to-water heat pumps can provide both space and water heating from a single appliance – and do so more efficiently than electric boilers.

Residential energy demand by service and fuel in Moldova, 2022



Source: IEA (2024), Energy End-uses and Efficiency Indicators.

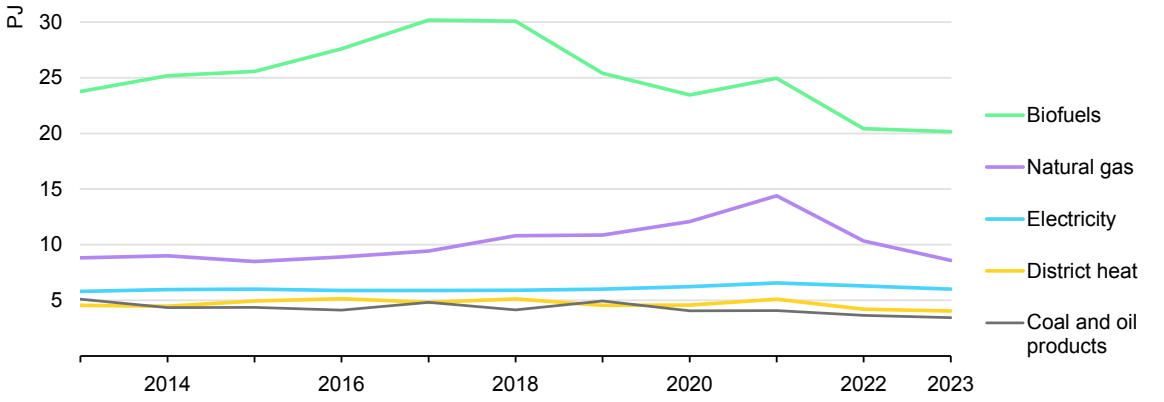
Over the past decade, demand for heating services in Moldovan buildings has fallen by around 12%. This broadly mirrors the country's 15% population decline since 2013 – a trend that accelerated after 2018. This wave of emigration coincided with a 35% drop in demand for home-heating biomass beginning in 2018

[3] More than 99% of Moldova's biomass resources are classified as "fuelwood, wood residues and byproducts". In 2023, wood pellets represented less than 5% of that total – though that was up significantly from 1.9% in 2020 and is still increasing.

– although until 2021 this was partially offset by an increase in natural gas use. From 2021 to 2023, Moldova's natural gas demand for heating dropped by 40%.

District heat demand declined more slowly during this period, while electricity consumption since 2013 has increased by around 4%.

Energy demand for space heating, water heating and cooking in Moldova, 2013-2023



Source: IEA based on data from National Bureau of Statistics.

While some of the decline in biomass use for heating can be attributed to Moldova's shrinking population, the country has also made efforts to transition from traditional biomass furnaces to more efficient boilers and stoves fuelled by wood pellets or briquettes. This is demonstrated by the 2011-2018 Energy and Biomass Project, a EUR 34.8 million initiative that funded the installation of efficient biomass boilers in public institutions.

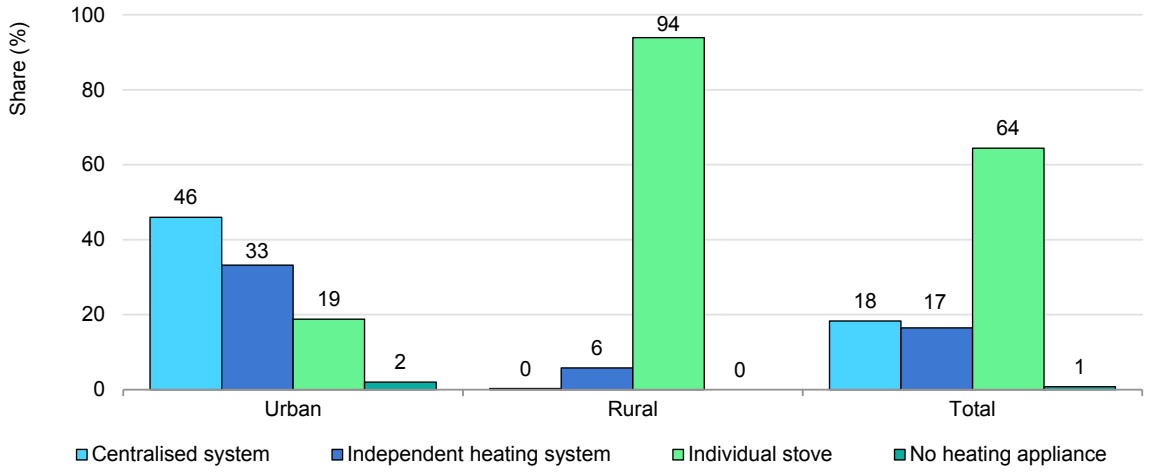
Moldova has significant heating system disparities between urban and rural households. Nearly half of urban households depend on centralised systems, which range from connection to a district heat network to shared use of a common boiler in a multi-family building. Another third of urban homes – mainly single-family units – rely on independent systems that supply heat to the entire residence (e.g. through a water-based distribution system). Around 2% of urban dwellings have no heating system whatsoever.

Rural households are almost entirely dependent on individual stoves – appliances that provide heat to a single room only and do not contain a distribution system. These homes are likely to have multiple such devices. Independent heating systems are uncommon, and centralised systems do not exist in rural areas.

Overall, this means that around 64% of Moldovan homes depend on individual stoves for their heating needs. This highlights a need not just to replace heating

appliances, but also to install complete heating systems in these homes, including piping, radiators and ductwork.

Share of dwellings by heating system and residential area in Moldova



Source: IEA based on data from National Bureau of Statistics.

District heating

Moldova's urban areas rely significantly on district heating. Overall, district heat supplies about 46% of urban dwellings and some 13% of national space heating demand. Moldova's district heating system relies on natural gas for more than 95% of its supply, with the rest coming from bioenergy and a negligible amount of oil. More than 99% of district heat is consumed in the two largest cities of Chisinau and Balti. Around 77% of district heat is delivered to households, 14.5% to public institutions and 8.4% to the private sector.

District heat consumption fell by more than 20% between 2010 and 2020, largely due to the retirement of gas-fired heat generation capacity. This trend has continued in recent years, falling another 11% between 2020 and 2023. The remaining district heat capacity is plagued by declining efficiency and output, largely due to underinvestment. In 2022, for instance, ANRE projected Moldovan Leu[4] (MDL) 677.3 million (EUR 34.5 million) of investment, but only MDL 137.1 million (EUR 7 million) was realised.

Efficient use of heat pumps in Moldova's existing networks would require major upgrades to convert them for operation at lower flow temperatures. An ongoing EUR 92 million project, sponsored by the World Bank and the International Bank

[4] Exchange rate: 1 Moldovan Leu (MDL) = 0.0512 EUR (as of 1 March 2025).

for Reconstruction and Development, is underway to modernise district heating infrastructure and improve cogeneration efficiency.

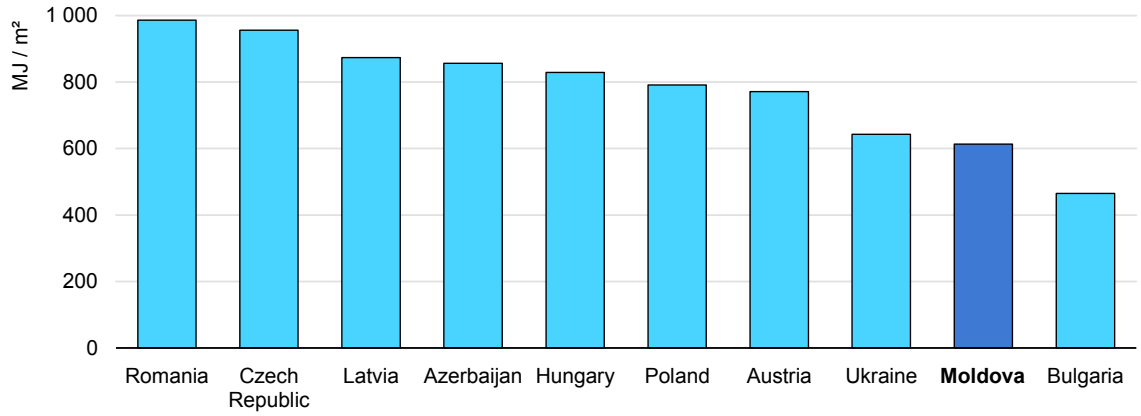
Heat pumps

Data on heat pump use for space and water heating in buildings is virtually absent from Moldovan energy statistics. As mentioned, electricity accounts for less than 1% of space heating demand. At present, Moldova has not adopted the European Union's updated methodology from the Renewable Energy Directive methodology for accounting for ambient heat from heat pumps. Including ambient heat in official statistics would provide a clearer picture of the role heat pumps could play in Moldova's future energy mix. For now, heat pump adoption is starting from a very low base. Government data also indicate a growing number of air-conditioning units being installed in the residential sector, driven by warmer summers.

Overview of buildings in Moldova

The Moldovan building sector is characterised by energy intensity that is both high and rising. While its performance is in line with neighbouring countries, improving energy efficiency remains a cost-effective way to lower heating demand. Improving efficiency supports the phase-out of imported natural gas and optimises heat pump performance, topics to be discussed further in the next section.

Energy intensity per square metre in selected countries, 2021



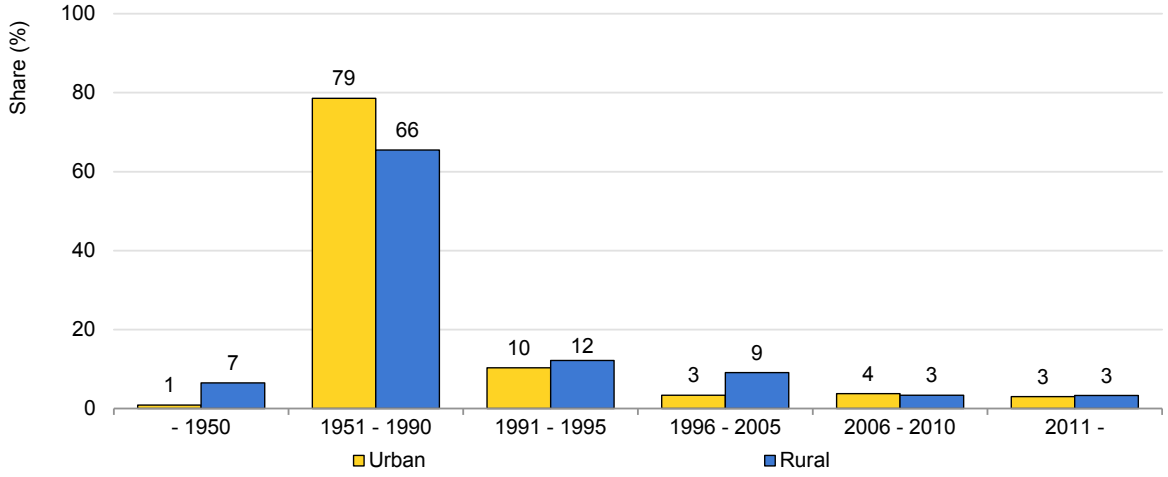
Source: IEA (2024), Energy End-uses and Efficiency Indicators.

Moldovan buildings have low fabric efficiency – i.e. the ability of walls, roofs, windows and floors to retain heat. Around 75% of homes were built before 1990, before the introduction of modern construction practices and energy efficiency standards. A brief construction uptick followed the fall of the Soviet Union, but only

14% of Moldova's homes have been built since 1996. Rural housing tends to be only marginally newer than urban stock.

Poorly insulated older buildings, particularly in rural areas, rely on inefficient, high-temperature combustion or hydronic heating systems. This reinforces demand for high-temperature district heating, as well as gas boilers that run at high flow temperatures and biomass stoves – all of which contribute to a cascade of inefficiencies throughout the energy system. Upgrading Moldova's buildings will not only foster heat pump deployment – it will reduce its reliance on natural gas, improve comfort and lower costs across the energy system.

Age of housing stock by year of construction in Moldova

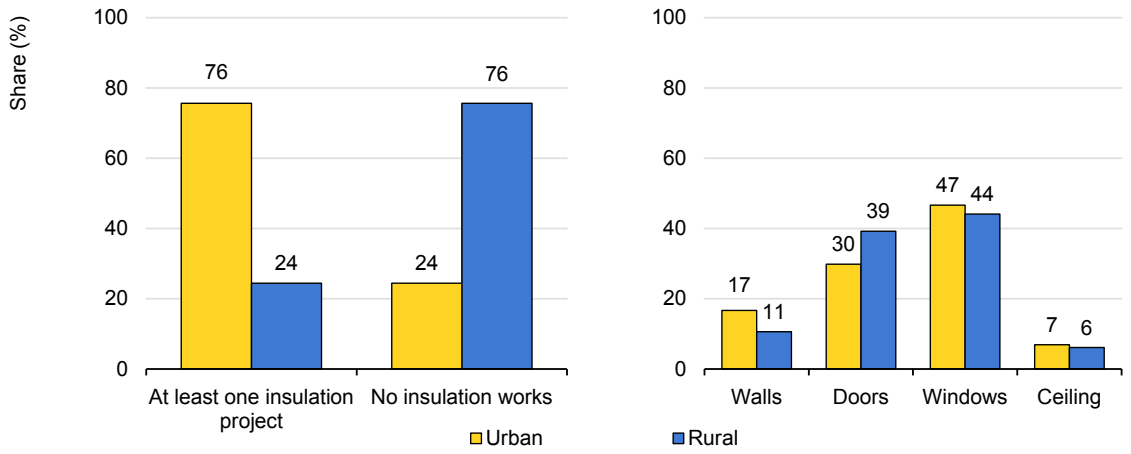


Source: IEA based on data from National Bureau of Statistics.

Moldova's efforts to renovate its ageing housing stock have been sharply split between urban and rural areas. Although urban homes are marginally older on average, around 76% had undergone some form of renovation by April 2022. In contrast, 76% of rural homes had not been renovated at all.

This should be understood in the context of energy use, as discussed earlier. Around 94% of rural households rely on individual stoves for heating – predominantly biomass – while urban homes are more reliant on district heating. Moldova's rural households may face greater challenges in renovating their homes, which is of particular concern given their heavy dependence on inefficient biomass stoves. This underscores the need for targeted policies to improve rural housing and promote more efficient heating appliances.

Housing stock with renovations completed by April 2022 and type of work



Source: IEA based on data from National Bureau of Statistics.

Heat pumps in Moldova

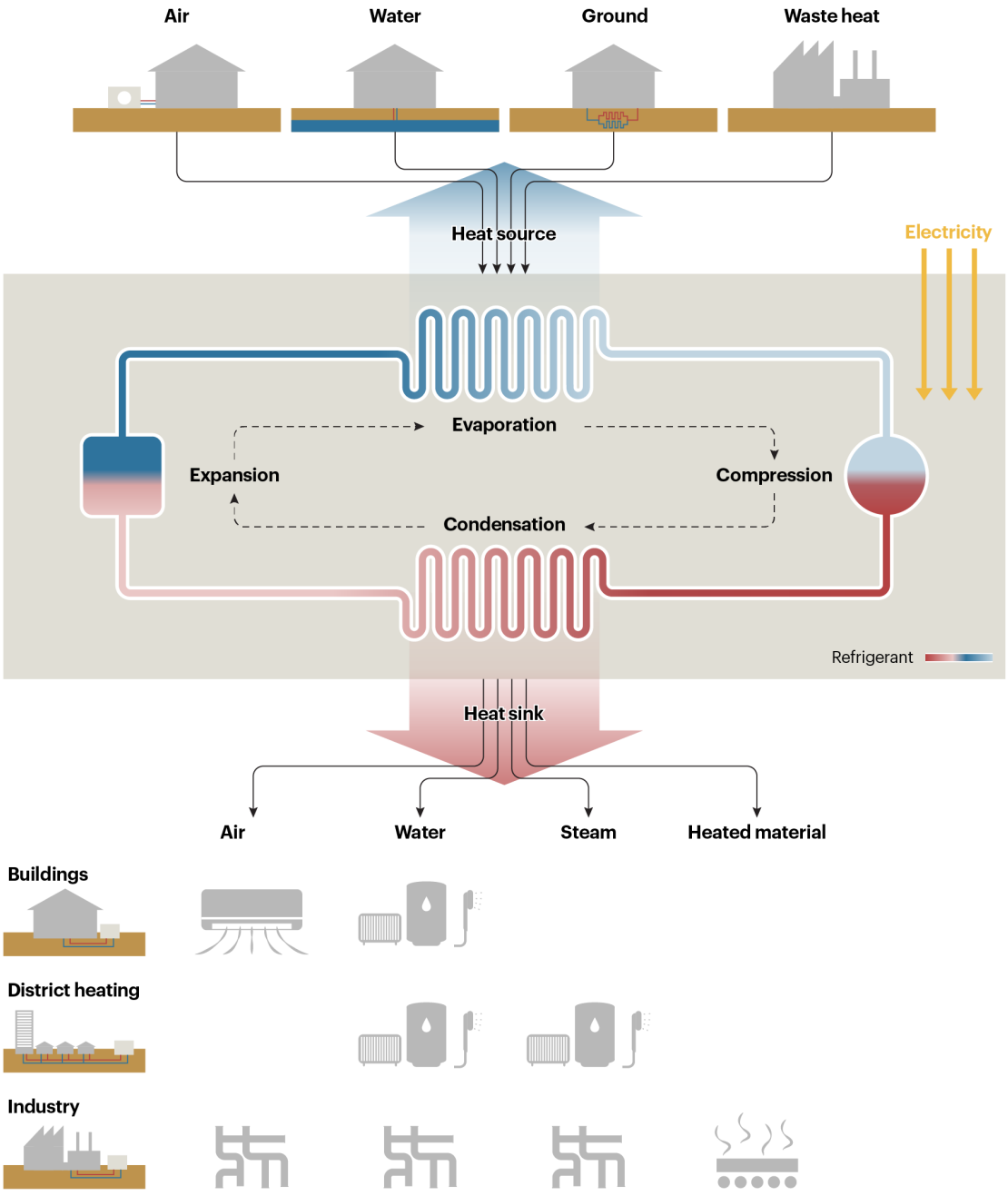
This chapter explores the benefits of heat pumps and their potential application in Moldova. It discusses different heat pump types and potential applications, then dives into the benefits of heat pumps in terms of energy efficiency, energy security, greenhouse gas emissions, economic development and EU accession. The chapter then discusses the status of heat pumps in Moldova and their potential, addressing the applications for which they are most suited in the Moldovan context.

Heat pump applications

Heat pumps have been widely recognised as a key technology for decarbonising heating in buildings, industry and district heating systems. Global and European scenarios, from the International Energy Agency to the European Commission, acknowledge their key role in transitioning from fossil fuel-based heating systems. The IEA identifies heat pumps as the "central technology" for decarbonising heating in buildings.

To understand their benefits, a brief overview of their operation is required. Heat pumps are different than combustion heating technologies. Instead of burning a fuel such as natural gas or biomass pellets and using the heat of combustion to provide space and water heating, a heat pump uses electricity to run a vapour compression cycle that transports heat from a colder source (ambient heat) to a warmer sink. For example, the heat pump extracts heat from the cold outside air to supply warm air inside a building. If providing cooling, the heat pump works in the opposite direction: it extracts heat from the warm inside air and transports it to the outside. This process is made possible using a refrigerant, whose properties let it expand and condense at lower temperatures than air or water.

Operating principles of a heat pump



Source: IEA (2022), The Future of Heat Pumps.

Types of heat pumps

The world's most common heat pumps use ambient air as a heat source. Air-source heat pumps can provide heating either via air (air-to-air heat pumps) or water (air-to-water heat pumps). Air-to-air heat pumps are common in the United States, Canada, the People's Republic of China (hereafter "China"), Australia,

Norway and Sweden, where they typically supply heating (and cooling) through ductwork or by installing multiple units in various rooms of a building.

Air-to-water heat pumps – also known as hydronic heat pumps – use a water-based distribution system to provide warm water to radiators. These are most common in countries that historically have gas-based hydronic heating systems, such as Germany, the Netherlands, Poland, the United Kingdom as well as parts of France and Italy.

Heat pumps also use the ground as a heat source. These devices are called geothermal or ground-source heat pumps and require the drilling of deep holes or digging of trenches in the ground where piping is inserted. Bodies of water, such as lakes and rivers, also can be used as a heat source for heat pumps, as is increasingly the case of large-scale heat pumps used for district heating. Waste heat also is a growing source of heat and is found in certain industrial heat pumps.

Heat pumps in buildings

Heat pumps are widely used to provide space heating and domestic hot water in individual buildings, multi-family residential and large commercial buildings, among other typologies. Air-to-water and geothermal devices achieve this via a heat distribution system, such as radiators or underfloor heating. Air-to-air systems use forced air, sometimes with a ducted heat distribution system that transfers warm air from the heat pump output throughout the building. In reverse mode, these systems also provide cooling and are commonly known as air conditioners. Buildings are by far the most common application of heat pumps today: around 2 million were sold in Europe in 2024, chiefly for this purpose.

Examples of heat pumps in multi-family residential buildings exist across Europe. In Milan (Italy), a 120-kW air-to-water heat pump provides heating, hot water and air filtration to 21 apartments, while in Lourdes (France), three low-temperature air-to-water heat pumps service 197 apartments with R32, a low-GWP refrigerant. In Turek (Poland), a geothermal heat pump constructed in 2022 provides heating and hot water to 24 apartments. More examples of heat pumps in multi-family buildings can be found on the website of the IEA's Technology Collaboration Programme on Heat Pumping Technologies.

Industrial heat pumps

Industrial heat pumps provide low-temperature process heat. This has applications for hot water and steam generation in many sectors, such as food and drink, as well as the paper, textile and chemicals industries. Industrial heat pumps can reach temperatures up to 165°C – or even higher if coupled with a waste heat source. Many European countries provide subsidies for industrial heat pumps.

Recent examples of industrial heat pumps in Europe include a device producing heat at 140°C for drying paper pulp in France, while BASF recently received government funding to construct an industrial heat pump that will use waste heat to produce 500 000 tonnes of steam per year.

Heat pumps in district heating networks

In district heating networks, heat pumps supply central heat at low temperatures that is then distributed through the network to provide space and water heating to buildings. Heat pumps can replace central fossil fuel heating plants in existing district heating networks, increasing the efficiency of the full system and significantly lowering its carbon emissions. They also can serve as the heating source in newly constructed networks.

Sweden's district heating networks run largely on heat pumps that use seawater as a heat source. In Cologne, a 150 MW heat pump was commissioned in December 2024, running on the Rhein river and supplying district heat to around 50 000 households.

Given the state of Moldova's networks, however, deploying heat pumps for district heating presents significant technical challenges. Such systems typically provide low-temperature heat – thus requiring significant upgrades to Moldova's thermal network as well as more energy-efficient buildings fitted with equipment (e.g. radiators and heat distribution mechanisms) that can operate at lower temperatures. A significant modernisation of Moldova's district heating infrastructure is therefore essential.

Moldova's heavy reliance on combined heat and power (CHP) plants for district heating provides additional options. Researchers have analysed the possibility of using heat pumps to preheat water for district heating in the city of Balti, for example, finding that this improves energy efficiency and reduces CO_2 emissions. Industry suggests that large-scale industrial heat pumps could be used to increase efficiency, reduce natural gas consumption and lower the greenhouse gas emissions of existing CHP plants. These heat pumps could run on waste heat, water sources or another suitable energy source depending on location.

Moldova's NECP also includes measures for integrating heat pumps into district heating networks, with a particular focus on ground-source, water-to-water and waste heat recovery heat pumps. The NECP aims to integrate 7 MW of heat pumps into the country's two main heat utilities, CET Nord and Termoelectrica.

Benefits of heat pumps for Moldova

Efficiency and energy savings

A key advantage of heat pumps is their efficiency compared to conventional heating technologies. The newest models of combustion heating devices are typically around 95% efficient: for every 100 units of fuel they consume, they produce 95 units of heat. Typical heat pumps achieve a coefficient of performance of 3-4: for every 100 units of electricity they consume, they provide around 300-400 units of heat.

This means that replacing a fossil fuel heating system with a heat pump will result in around 80% energy savings at device level. Heat pumps are eligible for many energy efficiency obligation schemes in European countries and help contribute to national and European targets for energy efficiency.

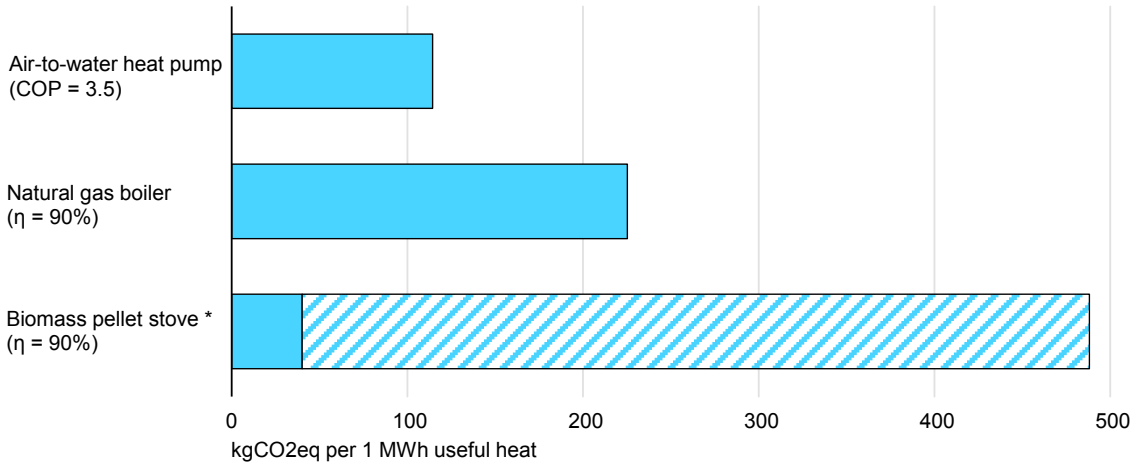
Moldova's growing expansion of wind and solar power also creates opportunities for a more efficient energy system based on heat pumps. This is because heat pumps can integrate effectively with a power system based on variable renewables, providing an important source of flexibility during times of low – and high – production. Using heat pumps flexibly also can contribute to grid reliability as the share of variable renewables increases.

Greenhouse gas emissions

Heat pumps typically result in lower greenhouse gas emissions than their fossil fuel counterparts. The ambient heat used by a heat pump is a renewable, emissions-free source of energy. While the electricity used to run the heat pump can be associated with emissions, the pump's efficiency means that each unit of heat produced will require fewer emissions. Even when electricity grids are based heavily on fossil fuels, the use of efficient heat pumps can ultimately reduce emissions.

As such, using heat pumps is likely to rapidly lower any country's greenhouse gas emissions, especially while simultaneously decarbonising the electricity supply. In Moldova, replacing a gas boiler with a heat pump would likely decrease emissions by half, while replacing a biomass pellet stove would reduce them roughly fourfold (considering the country's carbon-intense electricity grid, which averaged around 400 kg CO_2eq/MWh from 2018-2023). While majority of the greenhouse gas emissions from pellet stoves can be considered carbon-neutral (see shaded area in the figure below), this depends on activity in the land use, land-use change and forestry (LULUCF) sectors. Since 2021, Moldova's LULUCF sector has shifted from a carbon sink to a carbon source. If this trend continues, expanding biomass-based heating solutions would likely increase emissions.

Greenhouse gas emissions per unit of useful heat output in Moldova



Notes: Includes only estimated CH_4 and N_2O emissions from biofuels. Average 12-month (Feb 2024-Feb 2025) grid electricity emissions: 416 $kgCO_2eq/MWh$. *The shaded area represents CO_2 emissions originating from biomass use that are accounted for under land use, land-use change and forestry (LULUCF). CH_4 and NOx emissions from combustion are accounted for when calculating the CO_2eq values. COP = Coefficient of Performance; η = device efficiency.
Source: IEA based on data from GOV.UK and Xu et. al.

Local air pollution

Heat pumps produce no local emissions during operation, resulting in lower air pollution compared with fossil fuel heating devices. In contrast, biomass combustion is a significant source of pollution in Moldova: some 12.5% of fine particulate matter air pollution (PM2.5) is linked to burning fuelwood and coal for space and water heating. Any pollution associated with the lifecycle of heat pumps is produced either during their manufacture or in the production of the electricity used to power them. It should also be noted that many heat pump models also use fluorinated gases as refrigerants – potent greenhouse gases that pose their own climate risks. Proper handling and disposal can minimise their effects, however, and alternative refrigerants are available as substitutes.

Energy security

Lowering the use of fossil fuels in heating is essential to addressing energy security risks, especially in countries that rely heavily on fossil fuel imports, such as Moldova. Heat pumps can help rapidly shift Moldova's heating demand away from natural gas, a risk especially prominent since the vast majority of natural gas is used in households for home heating. Phasing out coal for heating will also greatly contribute to improved air quality, as well as energy security.

Switching to heat pumps may increase risks of other energy security concerns, however, including strained electricity supply, grid bottlenecks or power outages. We can roughly estimate that replacing natural gas and coal for space and water

heating in buildings (about 8.55 PJ of energy) with heat pumps operating at a seasonal coefficient of performance (COP) of 3 would increase electricity demand by around 2.85 PJ. This is equivalent to about 10% of Moldova's total electricity demand in 2022 (25.6 PJ) and 20% of building electricity demand (11.4 PJ).

This risk can be pronounced during colder months, when heating demand reaches its peak, heat pump performance declines, and the power grid comes under increasing pressure. Cold-climate heat pumps can be a solution, maintaining high performance even at temperatures as low as -25°C. Efficient buildings, coupled with demand-side flexibility, can help ensure the electricity grid operates normally during these peak periods.

Economic development and job creation

Another important benefit of heat pumps is economic development and job creation. The IEA foresees the global heat pump work force increasing almost threefold, to 1.3 million workers by 2030 – led in particular by demand for heat pump installers. A current shortage of qualified installers is believed to have created bottlenecks in the heat pump supply chain, ultimately driving up prices. Training a skilled work force will be essential for Moldova and could open new avenues for job growth. Moldova could also bolster its economy by investing in heat pump manufacturing, securing local jobs and potentially targeting the European Union as an export market, where demand is expected to grow significantly.

Reducing energy poverty

Moldova defines energy poverty as a situation in which the consumer lacks access to modern energy sources and technologies, or has insufficient purchasing power for energy sources, or lacks thermal comfort at home. The NECP reiterates targets from Moldova's 2022 national development strategy (European Moldova 2030) for reducing energy poverty, notably aiming to lower absolute poverty levels at least 50% by 2030.

In Moldova, rural households face a heavier energy cost burden than urban ones, spending around 11.8% of disposable income compared to 9.6%. This leaves rural households more vulnerable to price shocks. Meanwhile, Moldovan households with district heating tend to see lower incidences of energy poverty (2% to 5% of the population) compared to those with individual heating systems such as natural gas or biomass (10% to 17%).

Heat pumps can help reduce energy poverty by efficiently using electricity in individual applications, as well as in district heating networks, both of which tend to be associated with lower rates of energy poverty. As will be discussed, reducing

energy poverty with heat pumps is contingent on rebalancing energy prices and ensuring that heat pump performance is optimal.

European Union integration

Moldova began open accession negotiations with the European Union in December 2023. Its successful referendum in November 2024 underscores the country's dedication to joining the bloc. Outlining an effective path to decarbonise its energy use is a prerequisite, and heat pumps can help in this regard as well as help Moldova meet its commitments under the Energy Community Treaty. A forward-looking approach to heat pump manufacturing can also help strengthen Moldova's status as an accession candidate whose energy sector plans align with those of the European Union.

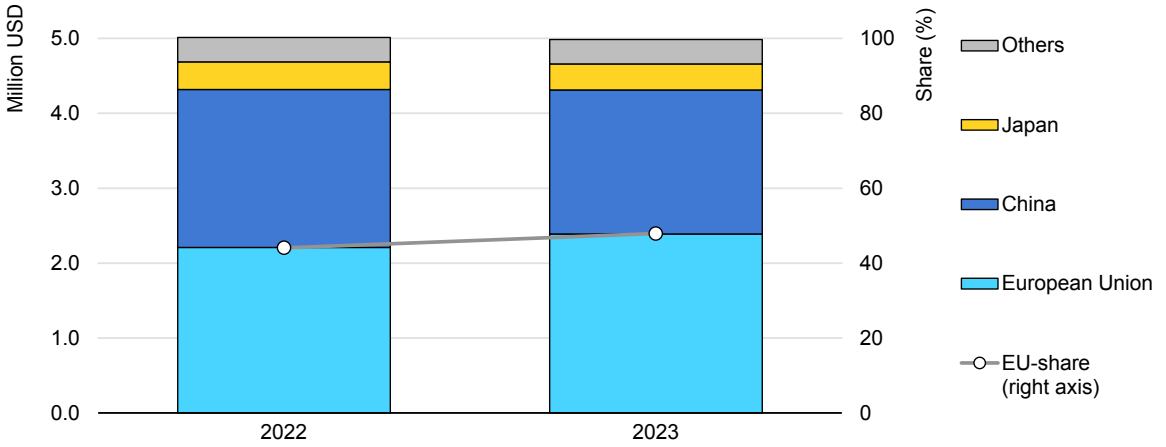
Status of heat pumps in Moldova

Despite a growing interest from policy makers, heat pumps remain an uncommon technology in Moldova. Data on Moldovan heat pump usage is scarce and there is currently no entity responsible for collecting figures on heat pump sales. Where they exist, heat pumps are used primarily for building space heating. The lack of a domestic heat pump industry or a corps of trained installers means that installations are expensive – further limiting consumer demand.

Moldovan heat pump market

There is limited data on the number of heat pumps sold and installed in Moldova. Estimates of the market can be made by analysing heat pump imports to the country. Moldova imported heat pumps valued at around USD 5 million in 2023, roughly the same as in 2022. The share of imports from the European Union rose slightly to 48%, and was driven by France (16%), Germany (8%) and Sweden (7%). China supplied 39% of Moldova's heat pumps in 2023, down from 42% in the previous year.

Market value of heat pumps imported by Moldova, 2022 and 2023



Source: IEA based on data from United Nations (2025), UN Comtrade Database (database), accessed 15 March 2025.

Compared to other European countries, the value of Moldova's heat pump imports is low: Romania imported heat pumps valued at USD 48 million in 2023, Bulgaria at USD 18 million and Hungary at USD 56 million. Europe's established markets also import vastly more heat pumps per capita than Moldova, as well as meeting much of their demand with local production.

Value of heat pump imports in selected economies, 2023

Country	Import value (USD million)	Population (million)	Imports per capita (USD/cap)
Germany	1 120.0	83.3	13.45
France	525.0	68.3	7.69
Hungary	55.9	9.6	5.83
Bulgaria	18.4	6.4	2.86
Romania	48.2	19.1	2.53
United Kingdom	144.0	68.4	2.11
Moldova	5.0	2.5	2.03

Source: IEA based on data from United Nations (2025), UN Comtrade Database (database), accessed 15 March 2025.

Barriers to heat pump adoption

Notable barriers exist to heat pump adoption in Moldova. Many of these are common to other countries, even those with established heat pump markets and higher levels of consumer awareness of the technology. Nevertheless, overcoming these barriers will be critical for expanding heat pump adoption in Moldova.

- **Upfront cost of technology and installation.** Heat pump technology is expensive compared to existing heating technologies such as biomass stoves and natural gas boilers. A lack of industry experience and scale means that installations also are costly.
- **Low energy efficiency performance of buildings.** Moldova's existing building stock suffers from low performance. This could lead to poor heat pump performance, high costs and significant strain on the already-weak electric grid.
- **Reliance on biomass.** Especially in rural areas, Moldovans rely heavily on biomass systems for heating. Biomass is low-cost, domestically sourced and thus considered more reliable than fossil fuels. However, the use of biomass causes ecological problems and degrades local air quality, with harmful effects on public health. Moreover, the country's land use, land-use change and forestry (LULUCF) sector has become a net emitter of greenhouse gases since 2021, further undermining the case for expanding biomass-based heating. Yet for better or for worse, biomass also continues to play a role in helping Moldova meet its renewable energy targets.
- **Lack of public information and consumer demand.** Public awareness of heat pumps is low, while many citizens are reluctant to abandon traditional heating systems or are concerned about maintenance costs. This results in weak consumer demand, which in turn discourages industry investment in manufacturing and the training of technicians.
- **High levels of energy poverty.** Energy poverty is a major concern of the government. A divide persists between rural areas, which rely heavily on biomass, and urban centres, where district heating is more common. This highlights the need for energy policy that considers the energy poverty dimension.
- **Weak electricity infrastructure.** Moldova's transmission and distribution systems are overdue for an upgrade. Adding an additional electrical load will make this investment more pressing. Relying on an electrical source of heating without an established grid infrastructure could pose significant risks.
- **Lack of trained engineers for installation and for maintenance.** A shortage of a trained technicians drives up installation costs and adds to the hassle factor for consumers, particularly when technical issues arise and qualified technicians are unavailable.

The following chapters will examine potential solutions to these barriers. In many cases, addressing one barrier – such as low energy performance of buildings – can ease pressure on others, including a strained electricity infrastructure. By addressing these vulnerabilities early, Moldova has an opportunity to scale up its heat pump market sustainably while supporting its citizens through the transition.

Building the market

This chapter focuses on driving consumer and industrial demand for heat pumps while building a base of manufacturers and installers. It discusses energy pricing, including taxes and levies on electricity and gas, carbon pricing and other types of instruments to encourage the deployment of heat pumps in Moldova.

Communication

A main barrier identified during stakeholder consultations for this study was a lack of consumer knowledge and experience with heat pumps. This is an issue that should be addressed upfront, as it can result in uncertainty about the operation of heat pumps and spreading of misinformation about their applications or limits. Ultimately, a lack of consumer knowledge can suppress demand, which in turn discourages industry investment in both scaling manufacturing and training installers.

This knowledge deficit is less of a factor for district heating networks. Network operators are largely aware of the technology, and many participated in the IEA's stakeholder consultation on this project. In some cases, companies have already studied the feasibility of a switch to heat pumps in their networks; their primary concerns are the high upfront cost of the technology and a shortage of skilled maintenance workers. Increased exposure to international examples of heat pumps powering district heating networks – a key part of the communication process – could stimulate industry interest and offer innovative solutions to current challenges.

Effective communication is critical early on, since addressing a lack of knowledge up front is much easier than fighting widespread misinformation. Consumers may also be unaware of existing government incentives to promote heat pumps, especially since these have only been introduced in recent years. The 2024-2025 energy challenges stemming from the gas transit shut-off to Ukraine, alongside progress in diversifying Moldova's natural gas supplies, provide a timely opportunity to promote the benefits of heat pumps.

Awareness campaigns on heat pumps will be key to educating the public on the long-term cost savings potential for households as well as the environmental benefits. They will also help dispel some of the common myths observed in other countries, such as concerns over heat pump performance in cold climates and potential noise issues. Awareness campaigns should also target installers, since

they are often consumers' primary point of contact and play a crucial role in providing accurate information.

Increasing consumer knowledge to expand the adoption of heat pumps

Good communication is key for promoting heat pumps because it helps improve consumer knowledge and trust in the technology. Efforts to boost consumer awareness can be led by the government or be driven by industry and consumers themselves. Sweden's growth as a heat pump market can be attributed in large part to its efforts to fund research, provide subsidies and loans and roll out consumer information campaigns. Sweden dedicated half of its 1993 government procurement budget to information campaigns aimed at connecting heat pump manufacturers and households. As a result, heat pump sales doubled in the years that followed.

In Finland, a significant heat pump transition took place from 2000-2018, where installations moved from ground-source heat pumps to largely air-source units. This was supported by online discussion forums that focused on heat pumps. This facilitated the sharing of experiences and advice on heat pump models and sizing, as well as manufacturer reviews and led to the growing consumer understanding that air-source heat pumps can operate in cold temperatures.

Spurring demand for heat pumps

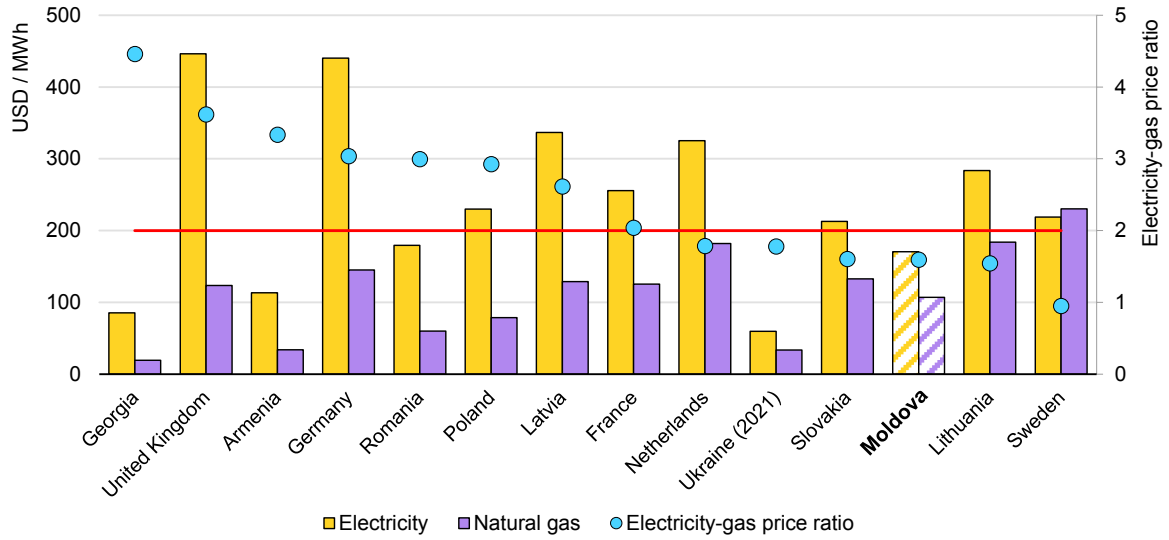
Creating stable, long-term consumer demand for heat pumps is critical for fostering broader industry growth. While limited awareness is a significant limiting factor, several other barriers also constrain uptake.

As in other countries, one of the main barriers to heat pump adoption in Moldova is the high upfront cost. Both the technology and its installation remain significantly more expensive than traditional standalone heating systems that use natural gas and biomass. Lowering upfront costs over the long term while providing support for heat pump purchases in the short term will be essential. Solutions to address this cost barrier are discussed in the following chapter on financing the transition.

Energy prices are another constraint on heat pump uptake. This is because in many countries, electricity is more expensive than fossil fuels per unit of energy. Due to a heat pump's efficiency, even if electricity is more expensive than natural gas, the useful heat produced may still be more affordable. For example, assuming a very low coefficient of performance (COP = 2), even if the electricity price were double the price of natural gas per unit of energy, a heat pump might still be cheaper to operate than traditional heating systems.

In Moldova in 2023, the price ratio was low enough that heat pumps were indeed more affordable to operate than gas boilers. According to the IEA's Energy Prices database, households paid an average of USD 171/MWh (2 950 MDL/MWh) for electricity and USD 107/MWh (1 850 MDL/MWh) for natural gas. Assuming a gas boiler efficiency of 90%, a heat pump would have been the more economical option at a COP of 1.5 or above.

Residential energy prices and price ratios in selected countries, 2023



Notes: The blue dots represent the electricity to natural gas price ratio and the red line corresponds to a price ratio of 2:1 (right axis). Yellow bars represent electricity prices and purple bars represent natural gas prices (left axis).
Source: IEA (2025), Energy Prices (database), accessed 23 March 2025.

Another lever for lowering heat pump operating costs is implementing time-of-use tariffs. These can either be dynamic, with prices adjusting at frequent intervals (e.g. every 15 minutes) throughout the day or simplified on-peak and off-peak rates. Distribution system operators in Moldova are working with the Ministry of Energy to pilot the installation of 35 000 smart meters, partly to test time-of-use tariffs.

In early 2025, the ANRE approved time-of-use tariffs with two rate windows, from 07:00-23:00 and 23:00-07:00. It was originally announced that the off-peak rate would be 25% to 30% cheaper, depending on the supplier and region. At the same time, the regulator said rates for district heating in the urban centres of Chisinau and Balti would increase. ANRE also adjusted its methodology for calculating regulated tariffs for natural gas to align with the European network code.

Another key development in energy pricing is the replacement of outdated vertical distribution heating systems with modern horizontal configurations that enable individual apartment metering and consumption-based billing. A utility switching fee was also abolished, allowing consumers to choose more cost-effective providers or those offering more competitive packages.

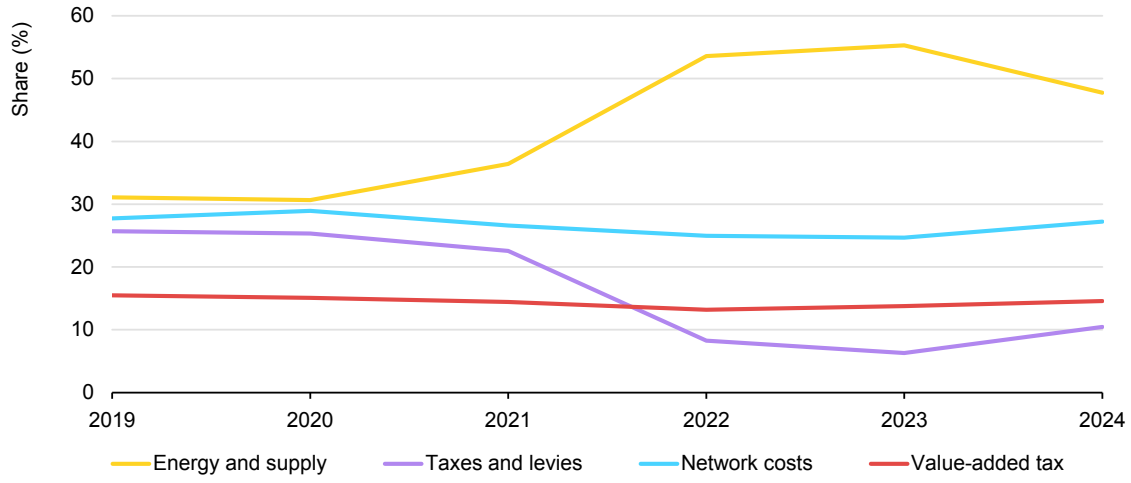
In the past, electricity and gas tariffs in Moldova involved cross-subsidisation, with higher-income households paying above-market rates to subsidise lower-income households who were charged below-market rates. While this practice yielded higher and less transparent energy costs overall, its gradual phase-out proved politically challenging due to the resulting tariff hikes for low-income users. This underscores the challenge of reforming energy tariffs in a way that sends accurate price signals while safeguarding equity.

In many countries, consumption taxes and levies represent a significant share of the price paid by end-users. These charges serve an important purpose, often incentivising investment in energy efficiency and generating public revenue to support clean energy. However, they are often disproportionately applied to electricity compared to natural gas and do not always reflect the environmental impacts of different fuels, especially natural gas and biomass. Electricity is also often subject to higher value-added tax (VAT) rates than fossil fuels.

In 2022, in the wake of the energy crisis, energy costs accounted for around 54% of the average European household's electricity bill, while 25% reflected network infrastructure costs. This was a sharp increase from 2019 – when energy and network costs represented a combined 59% of the bill. In 2024, taxes and levies accounted for 10% of the bill, down from 25% in 2020. Network costs and VAT rates remained stable over this period.

In contrast to most of the European Union, electricity and district heat provided to Moldovan households is exempt from VAT (as of 2024). VAT for natural gas used in households is set at 8%. Thus, residential electricity prices consist of energy and supply (95%) and network costs (5%). As of 2025 there are no confirmed plans to increase VAT, however any future adjustments must not create an imbalance between electricity and natural gas prices. In addition, VAT or other taxes should not be the primary tool to account for externalities, e.g. environmental impacts, but instead an additional price component, such as carbon tax included in the fossil fuel price. Balanced taxation will help make heat pumps more competitive on operating costs.

Evolution of electricity price components in the EU27 as a share of consumer tariffs, 2019-2024



Notes: EU27 = Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus[5], Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain and Sweden.

Source: IEA based on data from Eurostat (2025), Electricity prices for household consumers - bi-annual data (Data set, accessed 1 June 2025) and Gas prices for household consumers - bi-annual data (Data set, accessed 1 June 2025).

Rebalancing energy taxes and levies in the Netherlands

Across Europe, countries tend to apply more energy taxation per unit energy to electricity than to fossil fuels. This has been especially true in countries that have historically been the most dependent on natural gas, such as Germany, the Netherlands and the United Kingdom. These taxes and levies can be rebalanced in various ways to better reflect their environmental externalities. The Netherlands stimulated energy efficiency and clean heating by steadily increasing its taxation of natural gas, while reducing taxes on electricity and providing a lump-sum compensation to consumers. Between 2013 and 2021, tax rates for a typical household increased 84% on natural gas and decreased 25% on electricity. The Netherlands now boasts one of the lowest ratios of electricity to natural gas prices in Europe.

[5] Note by the Republic of Türkiye
The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the "Cyprus issue".
Note by all the European Union Member States of the OECD and the European Union
The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

This tax reform has bolstered heat pump sales in the Netherlands and, according to some estimates, has made heat pumps more affordable on a total cost of ownership basis compared to natural gas boilers. Such tax rebalancing can improve the affordability of heat pumps, but care must be taken to avoid disproportionately impacting impact low-income households who may lack the resources to switch to electric heating and could be burdened by higher taxes on fossil fuels.

Another way to stimulate demand for heat pumps is through energy efficiency obligation (EEO) programmes, which require energy utilities to help their customers achieve specific energy savings targets. EEOs often include heat pumps as an eligible technology due to their energy saving potential. Moldova's Energy Efficiency Obligation Scheme (Law No. 139/2018) and programme approval (Government Decision No. 1064/2023) allow for heat pump installations to meet these energy savings targets.

In the European Union, as of 1 January 2024, the Energy Efficiency Directive no longer allows measures relating to the use of fossil fuels to count towards energy savings targets. In practice, this means that replacing a natural gas boiler with a more efficient model will not count towards the targets.

Other mechanisms exist for improving the operating economics of heat pumps relative to natural gas. Many countries have introduced carbon prices which tax fossil fuels proportionally to their carbon emissions. In Sweden, the introduction of a carbon price was instrumental in expanding the heat pump market. The European Union is on track to introduce an update to its Emissions Trading Scheme (ETS2) that will target fuels used for heating and transportation. ETS2 is expected to come into force in 2027.

Fostering industrial and district heating demand for heat pumps presents significant challenges. Even in countries with more mature heat pump markets and industries, the use of heat pumps for these applications remains nascent. Unlike residential applications, industrial and district-scale heat pump projects require customised solutions, larger capital investments, and integration with existing energy infrastructure – making adoption more complex. Many industries and municipalities remain unaware of the full capabilities of heat pumps, particularly their efficiency in delivering high temperatures and their potential to integrate with waste heat sources.

The first step toward scaling deployment is clear, targeted communication of heat pumps' advantages, including energy savings, emissions reductions, and long-term cost benefits. By fostering dialogue among policymakers, industry leaders, and technology providers, the market can build confidence, address knowledge gaps and pave the way for broader adoption.

Increasing heat pump supply

Although spurring heat pump demand is important to laying the groundwork for a growing industry, there are still important measures to help stimulate heat pump supply at the same time.

Where they exist, heat pumps in Moldova are largely imported, yet there are established manufacturers active in the sector. ALTAL Grup S.R.L., founded in 2008 in Chisinau, makes air-source and geothermal heat pumps and provides metalworking services. DINA COCIUG S.R.L., founded in 2003, builds commercial refrigeration equipment, including air-to-air heat pumps (air-conditioning units). Like heat pump importers, these companies specialise in residential and commercial applications. As a result, industrial and district-scale heat pumps have no manufacturing presence in the country.

Various incentives could be used to encourage investment in Moldova's domestic heat pump industry. Tax breaks on new heat pump manufacturing facilities, for example, can be effective. In Poland, reduced corporate taxes in Special Economic Zones encouraged international heat pump manufacturers like Daikin and Viessmann to build production facilities there. Public loan guarantees can also help reduce investor risk, while International Financial Institutions offer low-interest loans and grants for clean manufacturing projects. (The European Bank for Reconstruction and Development, as well as the World Bank have a history of supporting projects in Moldova.)

Even in countries with mature heat pump markets, skills gaps can slow heat pump adoption. It is important to plan industry development from the outset and ensure that a trained work force is in place to install and maintain heat pumps in Moldova. Certification of heat pump technicians can play an important role in this.

The European Heat Pump Association (EHPA) offers the EUCERT programme to train and certify installers across the European Union, while national initiatives, such as the BWP Certification scheme in Germany and France's QualiPAC, provide standardised training and accreditation. Elsewhere, the North American Technician Excellence (NATE) certification ensures HVAC professionals are qualified to install and maintain heat pumps, while cities like New York also offer subsidised training. Canada provides grants for heat pump installer training, and the industry offers certification programmes. This is also the case in Japan, which certifies technicians through technical colleges. Moldova can update its Directive no. 1051/2018, which includes regulating the qualification and registration of heat pump installers, to develop such a certification programme. It also can further integrate heat pumps into existing engineering degrees at the Technical University of Moldova.

When it comes to district heating applications, local stakeholders indicated that maintaining these systems poses challenges. Often, the original installers do not

provide ongoing maintenance services, and the specialised expertise required is not available in-house. This gap leads many district heating operators to prefer Energy Service Company (ESCO) models that offer comprehensive solutions, including guaranteed maintenance. ESCOs not only handle the installation but also ensure long-term operation and upkeep of heat pump systems, often under performance-based contracts. The Wandsworth Riverside project in London relies on an ESCO to operate its heating and cooling system, for example.

Government support for installer training

Across Europe, countries recognise that the shortage of trained technicians is a major bottleneck to scaling up heat pump deployment. Governments are taking steps to encourage industry to train (and retrain) installers to meet growing heat pump demand.

The United Kingdom provides grants of up to GBP 500 for individuals to retrain as a heat pump engineers, as well as guidance for first-time installations. Included with this grant is a national directory of training providers and advice on how to certify heat pump installations yourself, avoiding the need for a building inspection. This type of support can also give a jumpstart to technicians looking to shift from fossil fuel to heat pump installations.

In April 2024, France unveiled an eight-point action plan for heat pumps that included a target to train 30 000 heat pump installers by 2030. The government also announced plans to create a Heat Pump Centre of Expertise. France also provides training for heat pump installers through a programme known as FEEBAT (Formations aux Économies d'Énergie dans le Bâtiment), which teaches how to install a heat pump, diagnose technical issues and advise clients on the system best-suited for their building.

Policy recommendations

- Narrow the electricity-to-gas price gap to make heat pumps more affordable
- Organise heat pump capacity building for officials and the public
- Roll out public awareness campaigns to inform citizens about the benefits and economic advantages of heat pumps
- Create stakeholder platforms for citizens and heat pump installers to engage and share experiences
- Introduce manufacturing incentives such as corporate tax breaks
- Establish facilities and programmes to train heat pump installers

Financing the transition

This chapter considers the economics of heat pumps versus gas boilers and biomass stoves. It explores the role of grants and subsidies and how these affect the lifetime cost of owning a heat pump compared to other heating technologies. Different policy options are then discussed, including potential avenues for multi-lateral policy support at both national and local levels.

As previously mentioned, a main barrier to heat pump adoption is the high upfront cost relative to prevailing heating technologies. Governments can help to lower this hurdle through mechanisms such as upfront subsidies or grants and low-interest loans. Another way to offset high upfront costs is to reduce the running costs, thereby shortening the payback time. This will also be explored as part of the total cost of ownership analysis.

Policy options to finance heat pumps

Governments can reduce the initial cost burden of heat pumps by providing subsidies, sometimes also referred to as “grants.” Upfront subsidies can take different forms: a flat-rate subsidy disperses a pre-defined lump sum, while a percentage-based subsidy reimburses a defined share of the total cost of the heat pump and its installation.

The Boiler Upgrade Scheme in the United Kingdom is an example of the former. The programme offers GBP 7 500 to any homeowner who replaces their fossil fuel heating system with a heat pump.[6] Germany has taken the latter approach, with a subsidy that covers up to 70% of the heat pump installation costs.

Flat-rate subsidies also can be based on household income. This is the case in France, where a grant programme, MaPrimeRénov, subsidises low-income households significantly more than the highest earners. This has the advantage of prioritising funding for those with the least means to afford a heat pump. The disadvantage is that such schemes can be complex and expensive to administer, as well as difficult for citizens to understand and access.

Subsidies also are often provided in the form of tax credits. When this approach is chosen, it is important to consider when the subsidy is available. Tax credits may work well for corporations, small businesses or wealthier citizens with sufficient

[6] It also provides GBP 5 000 for a biomass boiler.

capital to make an upfront investment in a heat pump in anticipation of a tax break. But for households unable to afford the upfront payment, this presents a challenge.

One solution is to provide point-of-sale rebates, where the tax credit is deducted immediately from the sales price. The United States Inflation Reduction Act offers this. Another is to provide zero-interest bridge loans – from a development bank or local municipality, for example – to cover the anticipated tax credit.

Energy companies can also provide subsidies through energy efficiency obligation (EEO) programmes. Under these schemes, energy companies are legally required to deliver a specified amount of energy savings to their customers. This can be achieved through heat pumps, since they help save energy. In France, clean heating activities benefit from a bonus in the EEO scheme. This creates an incentive for energy companies to pursue this activity, resulting in more clean heating installations. In practice, French energy companies – sometimes operating through third-party intermediaries such as installers – offer a subsidy of EUR 2 500 that can be combined with government support.

In April 2024, Moldova's Residential Energy Efficiency Fund (REEF) started providing percentage-based subsidies for energy efficiency measures in residential buildings. These cover up to 70% of the upfront cost of a heat pump in multi-family buildings and up to 50% for single-family homes. The same support is also provided for biomass boilers. There are no upfront subsidies available for gas boilers, a decision that is in line with the European Union's Energy Performance in Buildings Directive, which mandates the phase-out of subsidies for fossil-fuel heating devices as of 1 January 2025.

The grants provided by REEF also support the installation of household space and water heating systems with horizontal distribution. These typically replace existing vertical distribution systems linked to district heating, enabling households to have individual meters and improving overall energy efficiency.

Governments also can provide loans that reduce the upfront cost of a heat pump, or at least help customers defer the cost while they set up a payment plan. Many governments fund programmes that provide low-interest loans to home renovations, including heat pump installations. These loans also can be bundled into mortgages.

Financial institutions in Moldova have been able to access various lines of credit via the Green Economy Financing Facility (GEFF) supported by the European Bank for Reconstruction and Development (EBRD). These included USD 7 million earmarked for households, USD 42 million for companies that is already fully drawn as well as an active USD 20 million credit line for households and businesses. In 2024, the European Union announced that it would contribute EUR 9.5 million to the GEFF. This will include loans to banks that support energy

efficiency measures such as heat pumps and provide cashback and other incentives to lower the cost of efficiency improvements.

Heat-as-a-service is an emerging business model for heat decarbonisation, whereby energy service companies deliver a heating service instead of selling a fuel. The offers vary depending on the provider, ranging from appliance leasing to temperature guarantees. Customers are typically not required to pay much upfront for the heat pump (which continues to be owned by the energy company) and instead pay a subscription fee.

There currently are no heat-as-a-service business models active in Moldova, but industry stakeholders stressed the importance of energy service companies for maintaining heat pump devices used in district heating networks.

Reducing the VAT on heat pumps is another way drive down upfront costs. In July 2024, Moldova's Ministry of Energy proposed reducing the VAT on heat pump purchases to 8% from 16%. This is similar to efforts made elsewhere in Europe. Since 2022, the legal minimum VAT on heat pump purchases in the European Union has been 5%. As of November 2024, only five EU member states had set their VAT for heat pumps below the rate for gas boilers.

Total cost of ownership analysis

At current subsidy levels and energy prices, the average total cost of ownership (TCO) for a residential air-to-water heat pump in Moldova is similar to that of a natural gas boiler. These costs can be broken down into "upfront costs" and "running costs."

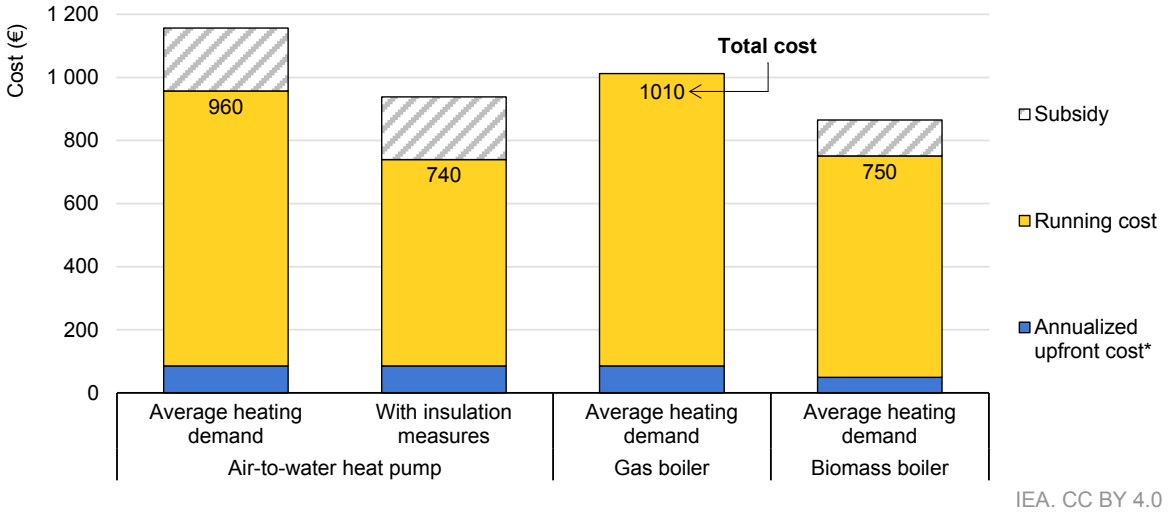
The average upfront cost of a heat pump is approximately MDL 100 000 (EUR 5 120), while an equivalent gas boiler costs around MDL 30 000 (EUR 1 530) and a biomass boiler MDL 57 500 (EUR 2 950).[7] Applying the 50% subsidy from REEF for a single-family home, the cost of an air-to-water heat pump decreases to EUR 2 560 and the biomass boiler to EUR 1 475. In other words, the upfront cost of the heat pump is about 67% more than the gas boiler after the subsidy is applied.

Relative to the upfront cost, the cost of operating the heat pump is significant. With current electricity prices of MDL 4 920/MWh (252 EUR/MWh) and current natural gas prices of MDL 16.74/m^3 (EUR 0.86/m^3), the annual cost of operating the heat pump over 18 years is around six times more than its annualised upfront cost. On a yearly basis, this leads to a TCO for a heat pump that is around the same as a gas boiler, but EUR 230 more expensive than a biomass boiler.

[7] These are indicative figures sourced from Moldovan stakeholders to represent a typical price.

Improving the energy performance of Moldova's buildings can have an important impact on the TCO. By applying insulation measures that reduce the space heating demand by 25%, the yearly TCO falls to EUR 800, slightly above the TCO of a biomass boiler (at average heating demand levels).

Annual cost of owning a heat pump, gas and biomass boiler, with and without insulation measures, 2025



* Costs are net of subsidy.

Source: IEA based on data from Eurostat (2025), Electricity prices for household consumers - bi-annual data (Data set, accessed 1 June 2025); Gas prices for household consumers - bi-annual data (Data set, accessed 1 June 2025); and national sources.

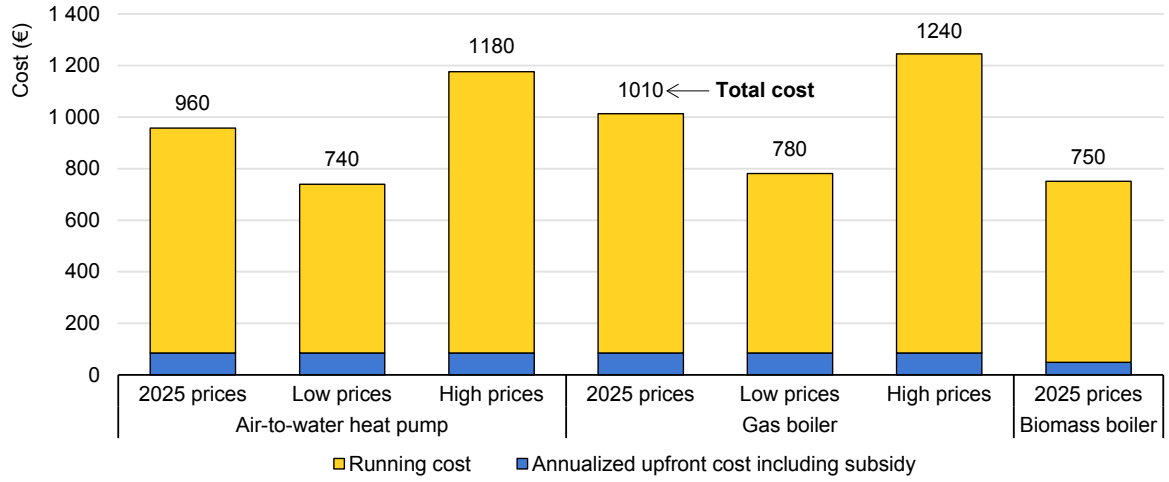
The prices used in this simulation are those from late December and early 2025, which ANRE recently increased. Applying a sensitivity analysis to both the heat pump and the gas boiler can reveal the impact of price increases and decreases.

In a situation where electricity and gas prices (before VAT) rise by 25%, this would result in an annual TCO increase of roughly EUR 220 for heat pumps and EUR 230 for gas boilers, making them both significantly more expensive than a biomass boiler. However, electricity and gas prices do not move in lockstep; in a future where gas prices spike, it is likely that electricity prices would rise more moderately, as was the case in many European countries during the energy crisis of 2021-2023. Likewise, if energy prices were to fall by 25%, the TCO of the heat pump and the gas boiler would decrease to around that of a biomass boiler.

A notable factor is the impact of VAT on electricity (currently 20%) and gas (8%). If VAT were removed, the running costs of heat pumps would increase by EUR 182 while those of the gas boiler would rise by EUR 215. If VAT rates were swapped, heat pump running costs would increase by EUR 196 and gas boiler by EUR 258. The impact of taxation in energy prices is significant, and as recommended in the previous chapter, Moldova should consider how to rebalance

these taxes to improve the affordability of heat pumps and shield this efficient heating technology from rising energy prices.

Annual cost of owning a heat pump, gas and biomass boiler, current, low and high price scenarios, 2025



Note: Costs are net of subsidy.

Source: IEA based on data from Eurostat (2025), Electricity prices for household consumers - bi-annual data (Data set, accessed 1 June 2025); Gas prices for household consumers - bi-annual data (Data set, accessed 1 June 2025); and national sources.

Overview of energy investment projects funded by International Financial Institutions

International Financial Institutions (IFIs) have played an important role in financing energy-related projects in Moldova. Notable support has been received from the World Bank, the European Investment Bank, the European Union, the European Bank for Reconstruction and Development, the United Nations Development Programme and the United States Agency for International Development.

This support includes around EUR 350 million of loans to ongoing projects to modernise Moldova's energy infrastructure by improving electricity interconnection with Romania; upgrading central heating in Chisinau and Balti; and enhancing energy security through European market integration, renewable energy, and digitalisation. A full overview of these projects can be found in the Moldova's NECP.

Policy recommendations

- Evaluate a flat-rate subsidy scheme to reduce administrative complexity and improve citizen responsiveness.
- Reduce VAT on heat pumps in line with the European Union's legal minimum of 5%.

Regulating the sector

Regulation plays a critical role in accelerating the adoption of heat pumps. This chapter discusses the range of regulatory tools available to Moldova, including building codes, appliance standards, restrictions on fossil fuel heating, energy labelling and heat planning or zoning measures.

Building codes and standards

Buildings remain a major source of emissions and energy consumption around the world. In Moldova, households are by far the country's biggest users of energy. Upgrades to building performance through energy codes are critical for lowering energy demand per square metre, as well as improving quality of life, reducing air pollution and making energy more affordable.

Energy codes dictate performance requirements for both new and existing buildings. In new buildings, they can be used to ensure that efficient building practices are used, and renewable energy is considered from the beginning. Typically, these standards are simpler to implement because they target industry, rather than the residential sector. In existing buildings, energy codes can specify minimum performance standards, encourage renovation and mandate the replacement of polluting appliances.

In Moldova, more than 75% of the building stock was built before 1990 and the rate of new construction is slow. As discussed earlier, there is also a significant gap between rural and urban renovation efforts. Building energy codes are essential for driving the retrofitting of older buildings with cleaner heating systems – and for ensuring progress in both rural and urban communities.

Moldova has transposed the European Union's Energy Performance in Buildings Directive (EPBD) into its law 282/2023. This was a key step towards ensuring improvements to building performance going forward. However, the EPBD was revised in 2024 and now contains important updates that are not yet reflected in Moldova's law. Changes relevant to heat pumps include an updated standard for zero-emissions buildings; improved energy performance certificates; minimum energy performance standards (MEPS) for non-residential buildings; and a quantitative target for a national renovation rate.

Heat pump deployment will be shaped by these measures – particularly the MEPS and the national renovation rate target – as well as by the broader policy framework and the extent to which Moldova prioritises heat pumps in building retrofits.

Appliance standards and restrictions

Standards for space heating appliances define the types of equipment that can be sold, setting minimum performance and environmental criteria. These standards have been in place in many European countries since the 1990s. By limiting inefficient systems, they play a crucial role in advancing Europe's energy transition.

Several countries have gone further by introducing stringent requirements for heating systems. Since 2022, new buildings in France can no longer be fitted with oil or gas heating systems, while Germany mandates that at least 65% of energy used in heating system replacements must come from renewable sources. The Netherlands has taken an even more aggressive approach: New connections to the gas grid were prohibited in 2018 and a 2014 law empowers local authorities to disconnect gas customers and shift them to district heating.

Appliance policies and their role in heat pump adoption

		Equipment type	
		Legacy equipment	**Heat pump**
Policy type	**Sales restriction**	• Complete ban on sales in new and/or existing buildings • Withdrawal of label of endorsement • Efficiency requirements	• Not applicable
	Appliance standard	• Direct emissions limits (e.g. low NOx) • Natural refrigerants with low global warming potentials	• Efficiency • Low-temperature performance (efficiency and maintaining heating capacity) • Noise • Correct operation of controls under realistic conditions • Natural refrigerants

Source: Lowes et al., as modified by the IEA.

Energy labelling schemes complement these measures by guiding consumers toward more efficient appliances. Moldova has fully incorporated the European Union's Ecodesign and Energy Labelling directives into national law. The European Union has been looking to go a step further, aiming to increasingly restrict the sale of devices that fall below an efficiency rating of 115%. In the United States, the EnergyStar program has stopped recognising fossil fuel appliances as "most efficient", reinforcing the shift toward low-carbon heating solutions.

Heat planning and zoning

National governments play a critical role in developing long-term integrated plans for the heating sectors. Given the substantial investments that heating systems require – whether for district heating networks or electricity grids to power heat pumps – a clear understanding of future heating demand and supply is essential for effective planning. A national heat study could help address this.

The European Union's 2023 revised Energy Efficiency Directive requires that all municipalities with more than 45 000 inhabitants undertake long-term heating and cooling planning. Municipalities play an important role in determining the thermal needs of their constituents, and they are well placed to convene all the actors involved in the sector. In addition, they can pass zoning laws mandating that certain areas be connected to a specific type of heating. Vienna, among many other cities, has defined district heating zones.

Data collection

Improving data collection on heat pump deployment in Moldova is essential for both market monitoring and assessing progress toward renewable energy targets. A more systematic approach to data gathering would enable policymakers to track the adoption of heat pumps, identify market trends, and address barriers to growth.

This includes gathering detailed information on sales and industry, as well as building stock and performance. It also involves integrating heat pump metrics such as "ambient heat consumption" into national energy statistics. Reliable data is also crucial for accurately calculating the share of renewable energy in heating and cooling, ensuring compliance with European Union reporting requirements. Strengthening collaboration between government agencies, industry stakeholders, and utilities can improve data accuracy and availability, supporting better policy design and investment planning for Moldova's heat pump deployment.

Policy recommendations

- Restrict natural gas and biomass in new buildings in line with the Energy Performance in Buildings Directive
- Restrict sales of fossil fuel boilers in existing buildings in line with the Energy Performance in Buildings Directive
- Consider a restriction on biomass in existing buildings in urban areas where air pollution may be significant
- Convene a national conference on heating and cooling planning which invites national and local governments
- Collect data on the heat pump market, renewable energy for heating and cooling, and building stock

A pathway for heat pumps

Heat pumps can strengthen Moldova's energy security, independence, air pollution and emissions, and even improve energy affordability. Given the regional turmoil – notably in the energy sector – over the past three years and into early 2025, there is a compelling case for reducing natural gas consumption by deploying heat pumps.

While Moldova is only beginning to realise its heat pump potential, this presents a significant opportunity to design the system effectively – by stimulating demand, expanding supply, financing the transition and establishing clear regulations. A comprehensive approach will help to ensure a steady and orderly deployment. The following table recommends specific actions with a time frame and suggested ministry to oversee the action.

Priority actions to grow the heat pump market in Moldova

	Responsible Ministry	TIME FRAME 2025	2030	2035	2040
Policy framework					
Develop a national heating and cooling strategy	ENER				
Clarify the role of heat pumps in heat decarbonisation and consider technology-specific targets	ENER				
Require local authorities to set out heating and cooling plans	ENER				
Adopt a long-term building renovation strategy	ENER				
Adopt new EPBD that is aligned with the European Union	ENER				
Update Renewable Energy Law so it accounts for ambient heat and electricity for heat	ENER				
Communication and coordination					
Organise heat pump capacity building for government officials and the public	ENER				
Roll out public awareness campaigns to inform citizens about the benefits and economic advantages of heat pumps	ENER				
Communicate with installers about the role of heat pumps to ensure they are properly informing their clients	ENER				
Create stakeholder platforms for citizens and heat pump installers to engage and share experiences	ENER				
Building the market					
Narrow the electricity-to-gas price gap	ANRE				
Introduce manufacturing incentives such as corporate tax breaks	MIRD				
Establish facilities and programmes to train heat pump installers	ENER				
Financing the transition					
Evaluate a flat-rate subsidy scheme	ENER				
Reduce VAT on heat pumps to 5%	ENER				
Regulating the sector					
Restrict natural gas and biomass in new buildings	MIRD				
Set a phase-out date for fossil boilers in existing buildings	MIRD				
Consider a restriction on biomass in existing buildings in urban areas where air pollution may be significant	MIRD				
Collect comprehensive data on heat pump market and industry, renewables for heating and building stock	NBS				

Annex

Total cost of ownership methodology

Calculations presented in this report show the total cost of ownership for an air-to-water heat pump, a gas boiler and a biomass boiler. This annex explains the methodology behind the assumptions and calculations.

The 2023 residential space and water heating demand numbers were taken from the Eurostat database on household final energy consumption (disaggregated). The average space heating demand per country was divided by the number of households (1.08 million), to reach an average space and water heating demand per household in Moldova.

Device characteristics

For each technology, the following conversion efficiencies were assumed:

- Air-to-water heat pump with a seasonal coefficient of performance (SCOP) of 3.1.
- Condensing gas boiler with an efficiency of 95%.
- Biomass boiler (assumed fleet efficiency) of 75%.

These efficiencies are largely accepted as industry standards and may even downplay the performance of heat pumps. For example, the Sustainable Energy Authority of Ireland reported a median SCOP of 3.95 in 2020, and Denmark and the Netherlands have seen SCOPs reach above 4.

The efficiency value used in this study may also be generous towards gas boilers, considering that it corresponds to the minimum as defined by Appendix X in the European Commission's Energy Efficiency Directive guidance note. Moldova's existing fleet of boilers is not comprised exclusively of the most energy-efficient units and would therefore likely operate at a fleet efficiency well below 95%.

Capital costs

The calculation for each technology consists of a capital cost component and an operating cost component. For upfront costs, values provided by local stakeholders were used. These values were MDL 100 000 (EUR 5 120) for an air-to-water heat pump; MDL 30 000 (EUR 1 536) for a condensing gas boiler and MDL 57 500 (EUR 2 950) for a biomass boiler. A 50% subsidy for a single-family home was applied to both the heat pump (EUR 2 560) and the biomass boiler (EUR 1 472) as provided by the Residential Energy Efficiency Fund. No subsidy was applied to the gas boiler.

Operating costs

In terms of operating costs, the price of fuel plays the greatest role. The electricity and natural gas prices used in this paper were taken from the regulated price decision of 3 January 2025 and confirmed with local stakeholders. These were MDL 4 920/MWh (252 EUR/MWh) and MDL 16.74 MDL/m^3 (EUR 0.86/m^3), respectively. A biomass price of MDL 4 600/tonne (EUR 236/tonne) was assumed, as recommended by local stakeholders. A VAT level of 20% was applied to electricity and biomass, while a rate of 8% was applied to natural gas.

Abbreviations and acronyms

ANRE	National Agency for Energy Regulation
CHP	combined heat and power
CO_2	carbon dioxide
COP	coefficient of performance
EED	Energy Efficiency Directive
EEO	energy efficiency obligation
ENER	Ministry of Energy
ENVI	Ministry of Environment
EPBD	Energy Performance in Buildings Directive
ESCO	energy services company
ETS2	EU Emissions Trading System extended to buildings and transport
EUR	euros
GEFF	Green Economy Financing Facility
LULUCF	land use, land-use change and forestry
MDL	Moldovan leu
MEPS	minimum energy performance standards
MGRES	Moldavskaya GRES power plant
MIRD	Ministry of Infrastructure and Regional Development
MWh	megawatt-hour
NAMA	nationally appropriate mitigation action
NARD	National Agency for Research and Development
NBS	National Bureau of Statistics
NCSE	National Sustainable Energy Center
NECP	National Energy and Climate Plan
PJ	petajoules
PM2.5	atmospheric particles with a diameter of 2.5 micrometers or less
RED	Renewable Energy Directive
REEF	Residential Energy Efficiency Fund
TCO	total cost of ownership
TFC	total final consumption
USD	United States dollars
VAT	value-added tax

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