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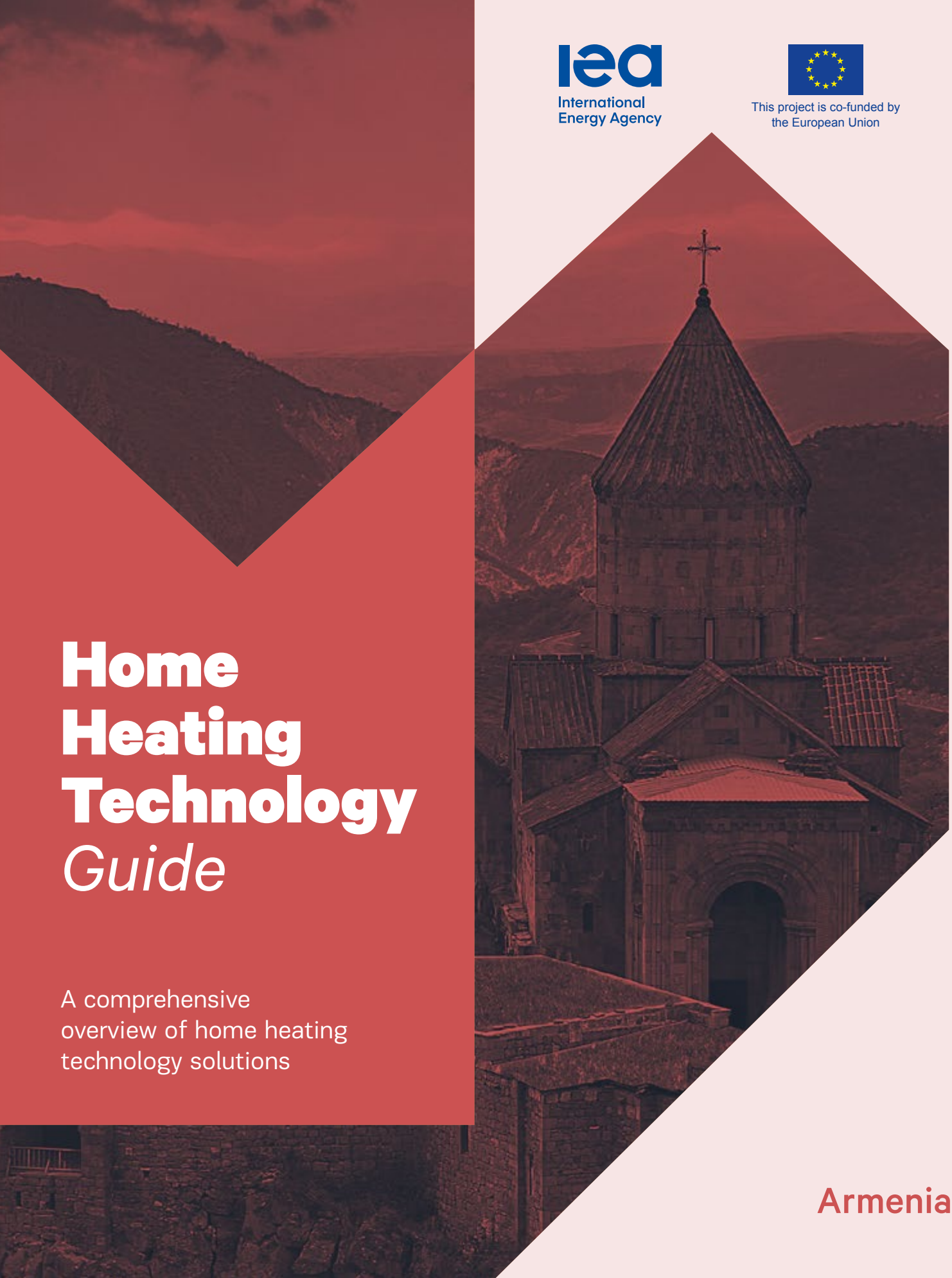
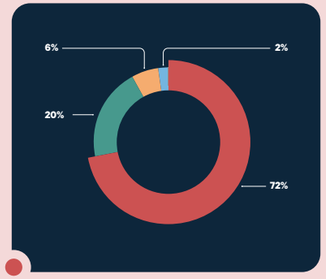


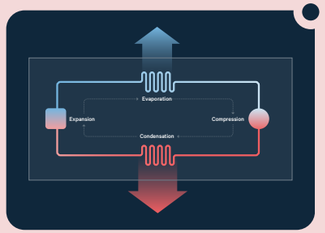
Home Heating Technology *Guide*

A comprehensive overview of home heating technology solutions

Armenia

Content





25%

Buildings account for more than 25% of Armenia's gas demand

Certain heat pumps models can both heat homes and cool them

Introduction

In Armenia, buildings play a significant role in the nation's overall energy consumption, accounting for nearly 40% of total demand.

Individual heating systems, primarily fuelled by natural gas, dominate Armenia's heating landscape. However, despite their widespread use in buildings such as homes, schools and stores, these systems often lag in terms of energy efficiency and sustainability compared with other options available on the market. More efficient and sustainable alternatives – such as heat pumps powered by low-emissions electricity – therefore deserve a closer look.

This guide offers a comparison of home heating options, supporting consumers in Armenia as they make decisions based on their personal energy needs and circumstances. Contractors can offer more customised advice and cost estimates.

FIGURE 1

Share of energy sources in residential sector, 2021 (TJ)

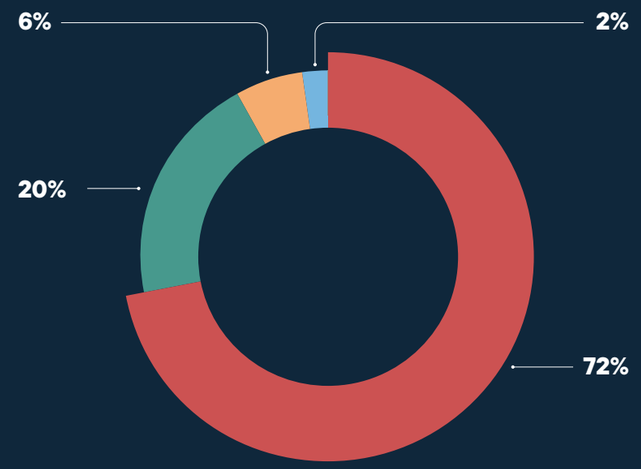
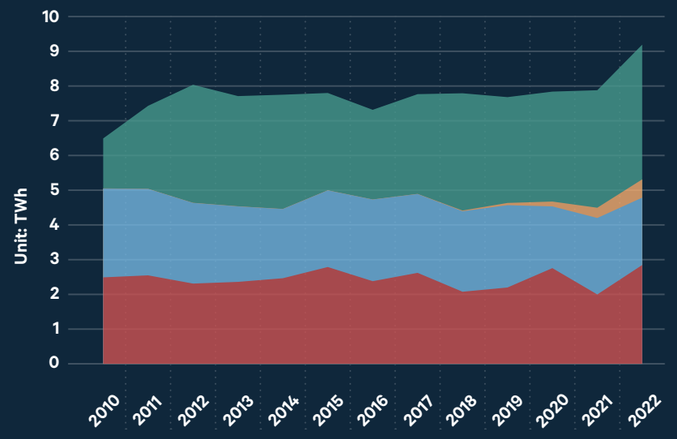


FIGURE 2

Electricity generation in Armenia, 2010-2022 *(TWh)*



Source: IEA World Energy Statistics and Balances (database), 2022.

Key context for Armenia

75%

of multi-apartment buildings in Armenia were built between 1951 and 1990

50%

Low-income households in Armenia spent up to 50% of their income on energy in 2020, primarily for home heating and cooking

Natural gas currently dominates Armenia's heating sector. In 2023, almost three-quarters of households relied on it, according to the Armenian National Statistical Service.

Electricity serves as an alternative heating source, particularly in urban centres, although its usage is less widespread compared with natural gas. Traditional fuels such as wood and coal are still utilised in rural regions where access to alternative heating infrastructure is limited, although their usage has been declining in recent years.

The energy consumption of existing buildings in Armenia is high, as the majority are older and do not match the most up-to-date energy efficiency standards, according to the IEA's Energy Efficient Buildings Roadmap for Armenia, which was published in 2020. This leads to significant costs for consumers. In fact, some low-income households spent up to 50% of their income on energy in 2020, primarily for home heating and cooking.

For this reason, further efforts to strengthen energy efficiency standards for both newly built and renovated homes could support the roll-out of clean heating technologies in Armenia, reducing energy bills and lowering carbon emissions.

Heating sector

Natural gas

72% household consumption

Firewood / Agricultural waste

are still utilized in some rural regions

Electricity

serves as an alternative heating source, particularly in urban centers

What is a heat pump?

A heat pump uses technology similar to what is found in a refrigerator or an air conditioner, but it works in reverse. It extracts heat from a source – the surrounding air, geothermal energy stored in the ground, or even waste heat from a nearby factory. It then amplifies and transfers the heat to where it is needed.

What are the benefits?

In Armenia, where the climate is characterised by cold winters and hot summers, adopting efficient and versatile heating technologies is essential. Heat pumps are particularly well-suited to meet energy needs in the country, since certain models can provide both heating and cooling.

Because most heat is transferred rather than generated, heat pumps are far more efficient than conventional heating technologies. In fact, current models are 3-5 times more energy efficient than gas boilers. They can also be cheaper to run.

There are wider advantages to installing more heat pumps as well. The International Energy Agency estimates that they have the potential to reduce carbon dioxide (CO_2) emissions by at least 500 million tonnes globally in 2030 – making it a key technology as countries work to bolster energy security and make their energy systems more sustainable.

Heat pumps can also be combined with other heating systems, such as those using gas, in hybrid configurations.

Heat pumps could help reduce CO_2 emission by at least 500 million tonnes in 2030 globally

=

Equal to the annual emissions of all cars in Europe today

1 Absorbing heat from outside

A heat pump collects warmth from the outside, which it uses to turn refrigerant, in its pipes, into vapour.

2 Bringing heat inside

The gathered vapour is compressed to heat it further, and transported into your home, releasing heat.

3 Releasing heat indoors

The super-hot gas passes its heat to the heat transfer medium, warming up the area. During this step, the vapour transforms back into a liquid.

4 Cooling down liquid

This liquid passes through a special valve, rapidly cooling it down to prepare for absorbing the outside heat.

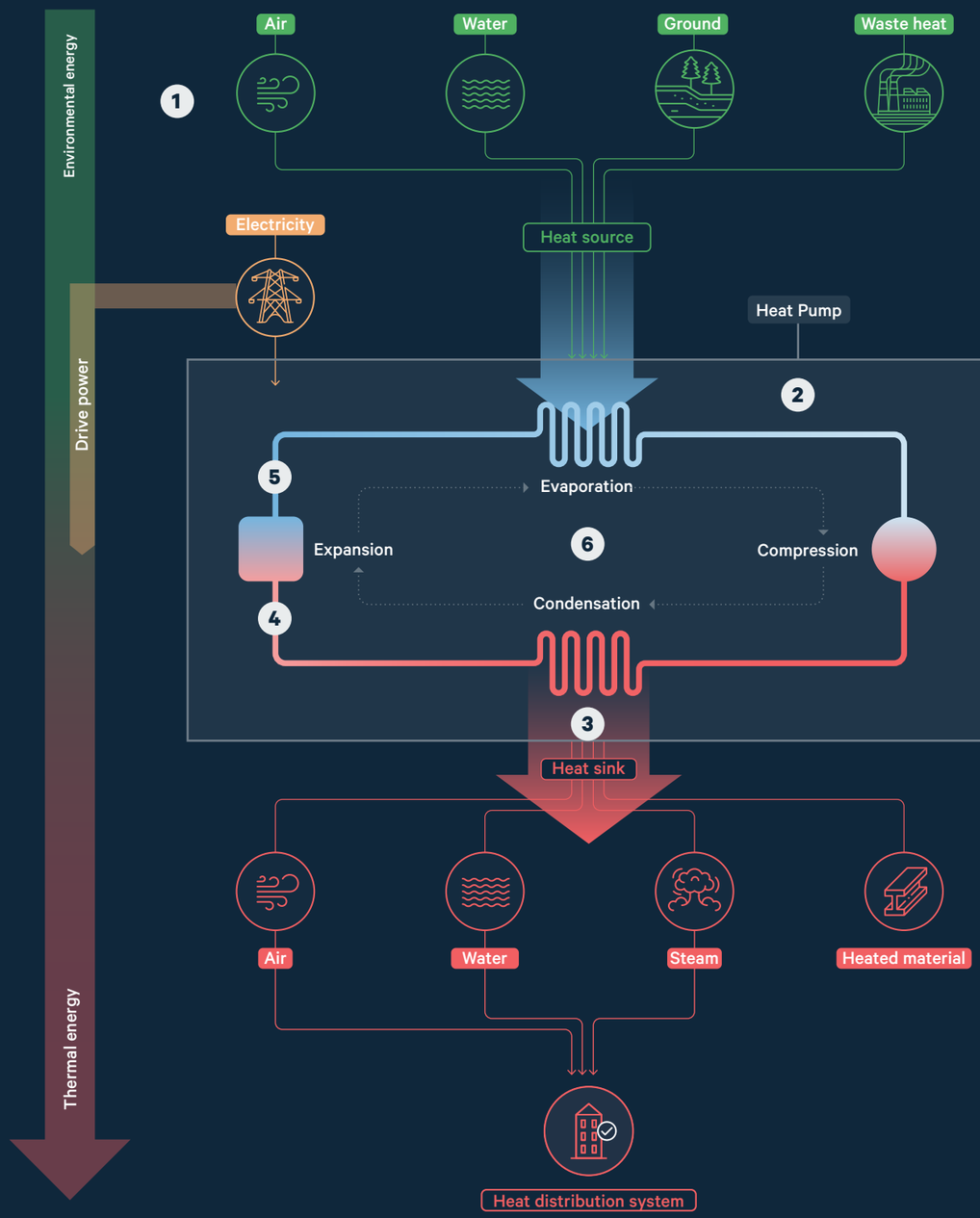
5 Optional cooling

Alternatively, the heat pump can reverse the process. It takes warmth from the inside and releases it outside, similar to opening a window to let out warm air.

6 Continuous cycle

The heat pump maintains a repeating cycle, either bringing warmth in to heat your home or moving warmth out to cool it down.

How does a heat pump work?



What heating options currently exist?

When it comes to home heating, consumers have a diverse array of options, from traditional systems that run on fossil fuels to cutting-edge sustainable solutions. This overview of technologies available globally allows for a closer examination of their individual characteristics and their potential role in achieving secure, sustainable heating for households in Armenia.

Air-to-Water Heat Pumps

These heat pumps use heat from the air outside to heat water for your radiators or underfloor heating. Since they move heat in and out of buildings instead of generating it, they are 304 times more energy efficient than fuel-based or electric heaters.

Air-to-water heat pumps are usually connected to a tank that provides hot water for heat distribution systems, bathrooms and kitchens. Some models also provide space cooling. They run on electricity, and when installed in well-insulated homes they can achieve significant energy bill savings.

Capacity
Heating, hot water and cooling

Average lifespan
15-18 years

Powered by
Electricity

Heats through
Radiators, underfloor heating

Energy bills
Up to 50% lower than for gas boilers. Saving are approximate and may vary.

Air-to-Air Heat Pumps

Air-to-air heat pumps use heat from the air outside to heat your home through in-room blowers or vents. As with air-to-water heat pumps, they are also 3-4 times more energy-efficient than fuel-based or electric heating systems.

Air-to-air heat pumps are ideal for homes without radiators or underfloor heating. They can also provide space cooling. Some models can be combined with water tanks to provide hot water for bathrooms and kitchens.

Capacity
Cooling, heating

Average lifespan
12-15 years

Powered by
Electricity

Heats through
Blowers

Energy bills
Up to 50% lower than for gas boilers. Saving are approximate and may vary.

Ground source Heat Pumps

Ground source heat pumps use heat from the ground outside to heat water for your radiators or underfloor heating. They are 4-5 times more energy efficient than fuel-based or electric heating systems.

Ground source heat pumps – as well as water source heat pumps that absorb heat from a nearby river, lake or pond, or from groundwater – are also more energy efficient than air-source heat pumps, as ground and water temperatures stay relatively stable compared with outdoor air temperatures.

Capacity
Heating, hot water

Average lifespan
20-25 years

Powered by
Electricity

Heats through
Radiators, underfloor heating

Energy bills
Up to 50% lower than for gas boilers. Saving are approximate and may vary.

Solar Thermal Heaters

Solar thermal heaters use solar collectors on the roof to produce hot water. While this hot water is mainly used in bathrooms and kitchens, it can also contribute to meeting your space heating needs if combined with other heating systems such as heat pumps.

When utilised in this way, solar thermal heaters can lower the energy costs of the system with which they are combined. They have lifespans of 15-20 years.

Capacity
Heating, hot water

Average lifespan
15-20 years

Powered by
Electricity

Heats through
Radiators, underfloor heating

Energy bills
Solar energy can lower the energy costs of the system it's combined with.

District Heating

Heat networks, available in some areas, are centralised systems that distribute heat to your home through underground pipes. District energy networks transfer heat to radiators or underfloor systems and might also provide hot water for bathrooms and kitchens. Some systems can also cool connected homes.

They run on various energy sources, such as combined heat and power plants or large-scale heat pumps, depending on the network.

Capacity
Heating, hot water and cooling

Average lifespan
20-25 years

Powered by
Various sources

Heats through
Radiators, underfloor heating

Energy bills
Up to 50% lower than for gas boilers. Saving are approximate and may vary.

Biomass Boilers

Biomass boilers burn wood pellets, chips or logs to heat water. This water then provides heat to radiators or underfloor systems. Other biomass heating systems, such as stoves, can heat a single room and can be combined with a boiler for hot water for bathrooms and kitchens.

Biomass heating systems can also be used in combination with solar thermal heaters or heat pumps. When installed in well-insulated homes, they can achieve significant energy bill savings.

Capacity
Heating, hot water

Average lifespan
20-25 years

Powered by
Biomass

Heats through
Radiators, underfloor heating

Energy bills
Up to 50% lower than for gas boilers. Saving are approximate and may vary.

Electric Radiators

Electric radiators are stand-alone units that generate heat by passing an electric current through a resistor. Households using electric radiators for space heating also need a hot water system such as a heat pump or electric water heater.

Energy bills are typically higher than for other technologies, and their lifespans are shorter, at about 10-12 years.

Capacity
Heating

Average lifespan
10-12 years

Powered by
Electricity

Heats through
Radiators

Energy bills
Higher than for other technologies.

Gas Boilers and Furnaces

Gas boilers and furnaces utilise natural gas to heat water for radiators or underfloor systems while distributing warmth via forced-air systems. These systems also cater to daily hot water needs in homes. Notably, nine European countries have initiated or announced bans on exclusive natural gas boiler installations, with similar measures in certain regions of North America and China.

Compared with low-emissions options like heat pumps, gas boilers and furnaces consume more energy. They typically have a lifespan of 15-17 years.

Capacity
Heating, hot water

Average lifespan
15-17 years

Powered by
Gas

Heats through
Radiators, underfloor heating

Energy bills
Higher than for low-emitting systems such as heat pumps.

2024

Renewable Resources and Energy Efficiency Fund

could ultimately support the adoption of energy-saving heating technologies such as heat pumps

Armenia's home heating transition

Armenia already has some supportive policies in place to support the transition to cleaner heating technologies. For example, the Renewable Resources and Energy Efficiency Fund of Armenia, which was set up in 2006, offers financial incentives to households and businesses investing in renewable energy systems, including heat pumps.

In 2017, the United Nations Development Programme (UNDP) also funded a project that aims to decarbonise the existing building stock in Armenia by scaling-up investment in energy efficient building retrofits. The overall investment risk profile of energy efficiency building retrofits is intended to be reduced to encourage private sector investment and reduce fuel poverty. The project covers single-family houses and multi-apartment buildings, as well as public buildings.

Other initiatives – including those focused directly on supporting the adoption of heat pumps – could further boost sustainable home heating in Armenia if they are well designed and targeted, sufficiently funded, and reflect consistent engagement with all stakeholders.

For further information on pathways for better buildings, please see our Roadmap on Energy-Efficient Buildings in Armenia (2020).[1]

1

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Armenia

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