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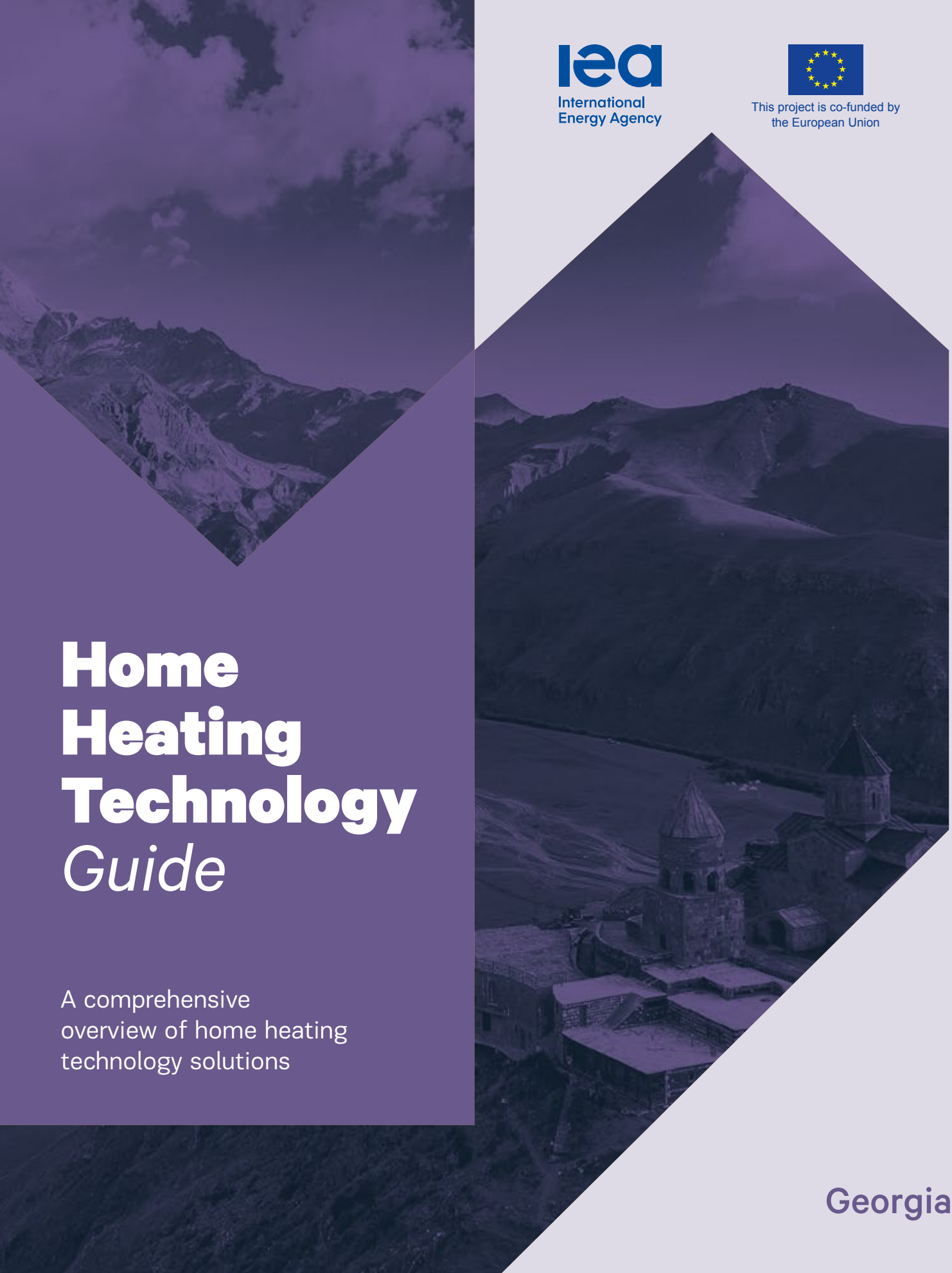

Home Heating Technology *Guide*

A comprehensive overview of home heating technology solutions

Georgia

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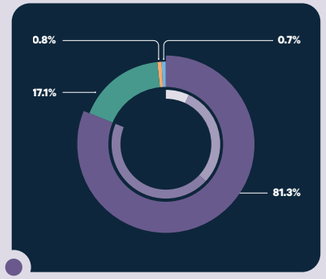

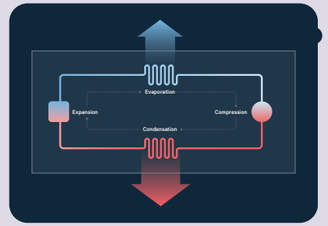

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40%

The building sector accounts for over 40% of the country's total energy consumption

Certain heat pumps models can both heat homes and cool them

Introduction

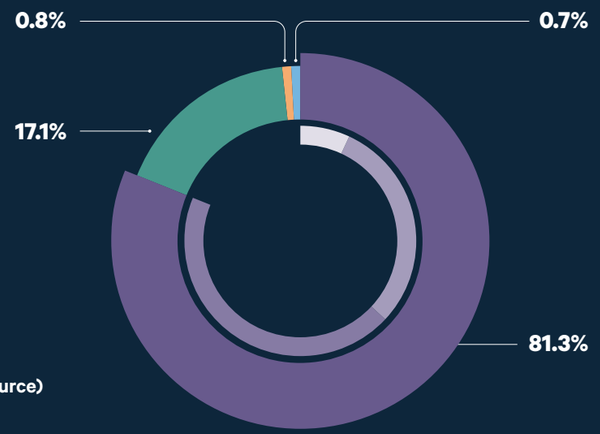
In Georgia, the buildings sector accounts for more than 40% of the country's total energy consumption, more than any other sector. Residential buildings make up most of the sector's demand. The vast majority are individually heated using natural gas boilers and biomass furnaces.

Despite their widespread usage, these heating solutions often fall short 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 Georgia as they make decisions based on their personal energy needs and circumstances. Contractors can offer more customised advice and cost estimates.

FIGURE 1

Georgia's heating system distribution
2023



- **Individual heater**
  - Electric
  - Firewood/agricultural waste
  - Natural gas
- **Individual central heating (natural gas)**
- **Individual central heating (other energy source)**
- **No heating**

Individual heaters

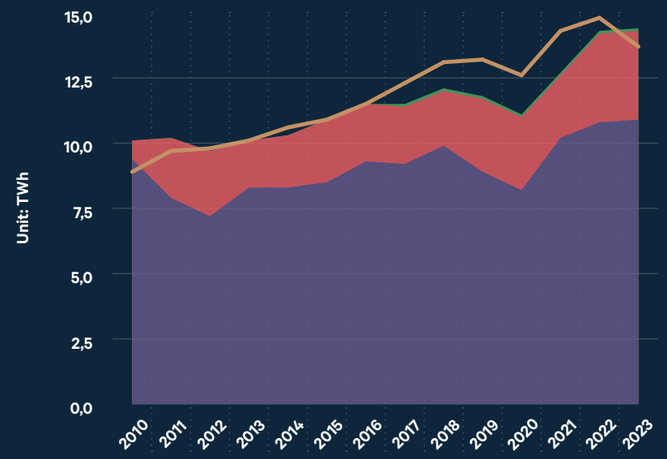
Natural gas
47%
of individual heaters consumption

Firewood / Agricultural waste
35%
of individual heaters consumption

Electric
6%
of individual heaters consumption

FIGURE 2

Georgia's electricity production and supply
2010-2023



- **Hydroelectricity**
- **Natural gas**
- **Other**
- **Domestic supply**

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

12%
Proportion of monthly spending by Georgian urban households that went towards utility bills in 2021

=

GEL 170
(EUR 46)

5%
only around 5% of the walls, floors and ceilings of residential buildings in the country are insulated

Key context for Georgia

Based on the Household Energy Consumption Survey conducted by the Georgian National Statistics Office (GEOSTAT) in 2023, heating facilities such as stoves and furnaces using natural gas (47% of households), electricity (6%) and firewood/agricultural waste (35%) are the most common forms of home heating, while 17% of households use central heating systems, which are primarily fuelled by natural gas.

Wider adoption of low-emissions and efficient technologies such as heat pumps would deliver many potential benefits. Georgia barely produces natural gas, which means it relies on imports to meet domestic demand. For this reason, a shift towards the electrification of residential heating would not only lower emissions, but also strengthen the country's energy security.

Georgia has numerous advantages it could tap to support this transition and expand electricity supply. The country has substantial hydropower resources that could be developed further, while existing central heating infrastructure in Georgia could be fuelled by large-scale heat pumps instead of natural gas.

There is also a strong case for improving energy efficiency in Georgia's residential sector more broadly. Currently, only around 5% of the walls, floors and ceilings of residential buildings in the country are insulated, which could be leading to higher energy costs for consumers.

Technologies such heat pumps work best in spaces that are well insulated, since it is easier to keep temperatures at their desired level in a stable and controlled environment.

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 Georgia, 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 also can 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.

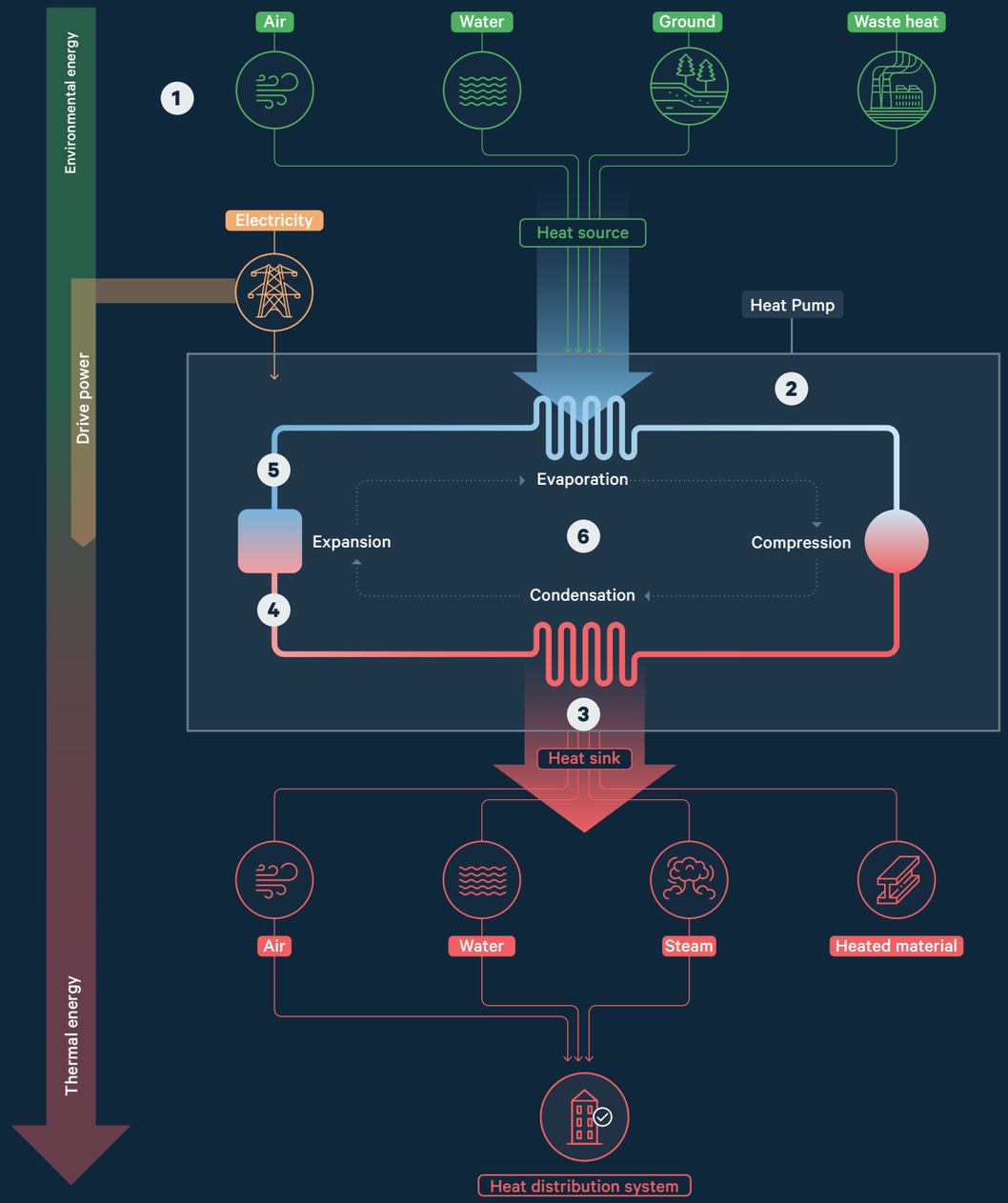
5 Optional cooling

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 Georgia.

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.

2021

Climate Change Strategy by 2030 laid out in 2021

2022

Minimum energy efficiency requirements adopted in 2022

Georgia's home heating transition

Not all of these technologies are widely used or available in Georgia right now, though the country is currently exploring initiatives and incentives to transition to a more secure and sustainable energy system.

The minimum energy efficiency requirements or building elements that Georgia adopted in 2022 marked an important step forward. Georgia also set long-term 2050 goals to limit greenhouse gas emissions from the housing sector in its Long-Term Low Emission Development Strategy, by increasing the use of renewable energy and heat pumps.

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

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Georgia

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