March 2024

# Cleaning up heat: Policy and the economics of heat pumps in Slovakia

Duncan Gibb

## Introduction

Building decarbonisation is a crucial aspect of Europe's shift to a low-carbon energy system and transition away from fossil gas. Slovakia, which depends heavily on fossil gas for heating, is representative of several Member States that hold strong potential for clean heat yet could risk stalling on their journey.

This paper[1] aims to discuss these barriers, based on a heat pump policy toolkit originally published in 2022 by Regulatory Assistance Project (RAP), CLASP and the Global Buildings Performance Network.[2] The policy strategies discussed here can also provide guidance to countries at a similar stage of heat pump deployment as Slovakia.

[1] The author would like to acknowledge and express his appreciation to Vladimír Orovnický (Slovak Association for Refrigeration and Air Conditioning), Petra Cakovska and Simona Listiakova (Spolocnost ochrany spotrebitelov Poprad), Richard Paksi (Buildings for the Future), and Louise Sunderland and Richard Lowes (Regulatory Assistance Project) for their helpful insights into early drafts of this briefing. Erica Falkenstein (Regulatory Assistance Project) provided editorial assistance.

Responsibility for the information and views set out in this paper lie entirely with the author.

[2] Lowes, R., Gibb, D., Rosenow, J., Thomas, S., Malinowski, M., Ross, A. & Graham, P. (2022). *A policy toolkit for global mass heat pump deployment.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/policy-toolkit-global-mass-heat-pump-deployment/

Among these approaches are recommendations for growing the adoption of heat pumps in Slovakia by rebalancing electricity and gas prices, particularly through shifting taxes and levies to enhance the cost-effectiveness of heat pumps. This is identified as the most critical hurdle, as heat pump running costs remain higher than fossil gas boilers at current energy prices. Additionally, stabilising and possibly increasing subsidies for heat pumps, with a focus on low-income households, will alleviate financial barriers and ensure long-term market predictability. Stronger regulation, such as restrictions on fossil fuel boiler installation, can provide clear direction, supporting both consumer and supplier planning for a smoother transition.

Source: Ostap Senyuk, Unsplash

# Decarbonising heating in Slovak buildings

Since 2019, Slovakia has introduced several pieces of legislation relevant to the decarbonisation of heating. Its Low-Carbon Development Strategy sets the broad climate legislation and supports shifting investments to clean technologies, including heating.[3] The Long-Term Renovation Strategy for Building Stock aims to reduce energy consumption in buildings by 40% by 2050 (compared to 2020 levels), emphasising a move from partial to deep renovations.[4]

Since 2019, the European Union (EU) has required each Member State to submit a National Energy and Climate Plan (NECP). Slovakia's NECP, last updated in October 2023, sets

[3] Slovak Republic. (2020). *Low-Carbon Development Strategy of the Slovak Republic until 2030 with a View to 2050.* https://unfccc.int/documents/212913

[4] Slovak Republic. (2020). *Long-term renovation for building stock*. https://energy.ec.europa.eu/system/files/2021-08/sk_2020_ltrs_en_version_0.pdf

several targets for the buildings and heating sectors.[5] In buildings, it aims to reduce CO2 emissions by 12% by 2030, compared to a 2020 baseline. The country also set an overall renewable energy target of 23% by 2030, an increase from the measured level of 17.4% in 2021.[6] The heating and cooling sub-target aims to achieve 28.3% of heating and cooling energy from renewable sources in 2030, up from 19.5% in 2021.[7]

Slovakia's NECP describes the country's predicted contribution from heat pumps by 2030. The amount of thermal energy (heat) provided by heat pumps is expected to nearly double, from 3.8 petajoules in 2023 to 7.3 petajoules in 2030. This doubling of energy from heat pumps over seven years would be an achievement. However, assuming energy demand in buildings is reduced by 20% by 2030 as planned, the projected amount of heat produced by heat pumps will only meet 9% of Slovak building space and water heating needs.

Slovakia's residential buildings use large amounts of fossil fuels for heating. As of 2021 (the latest data available), 45% of the energy used for heating and hot water came from fossil gas, which was slightly higher than the EU overall (40%). The next largest percentage was from direct use ofbioenergy, followed by heat delivered viadistrict heating networks.[8]

Around 3% of the energy used for heating comes from heat pumps. While this is still a small share, it has grown from around 0% in 2016. Heat pumps can supply heat both via standalone residential and commercial devices, as well as industrial applications or via large-scale heat pumps connected to a district heating system. Slovakia does have a significant share of district heating in its residential buildings, as shown in Figure 1,[9] although heating is virtually entirely fossil fuel-based. The challenges to grow heat pump use in district heating may differ from standalone applications.[10] As such, this paper focuses on advancing the uptake of standalone heat pumps in buildings.

[5] Slovak Republic. (2023). *Draft Update of the Integrated National Energy and Climate Plan for 2021-2030*. https://commission.europa.eu/publications/slovakia-draft-updated-necp-2021-2030_en

[6] Slovak Republic, 2023.

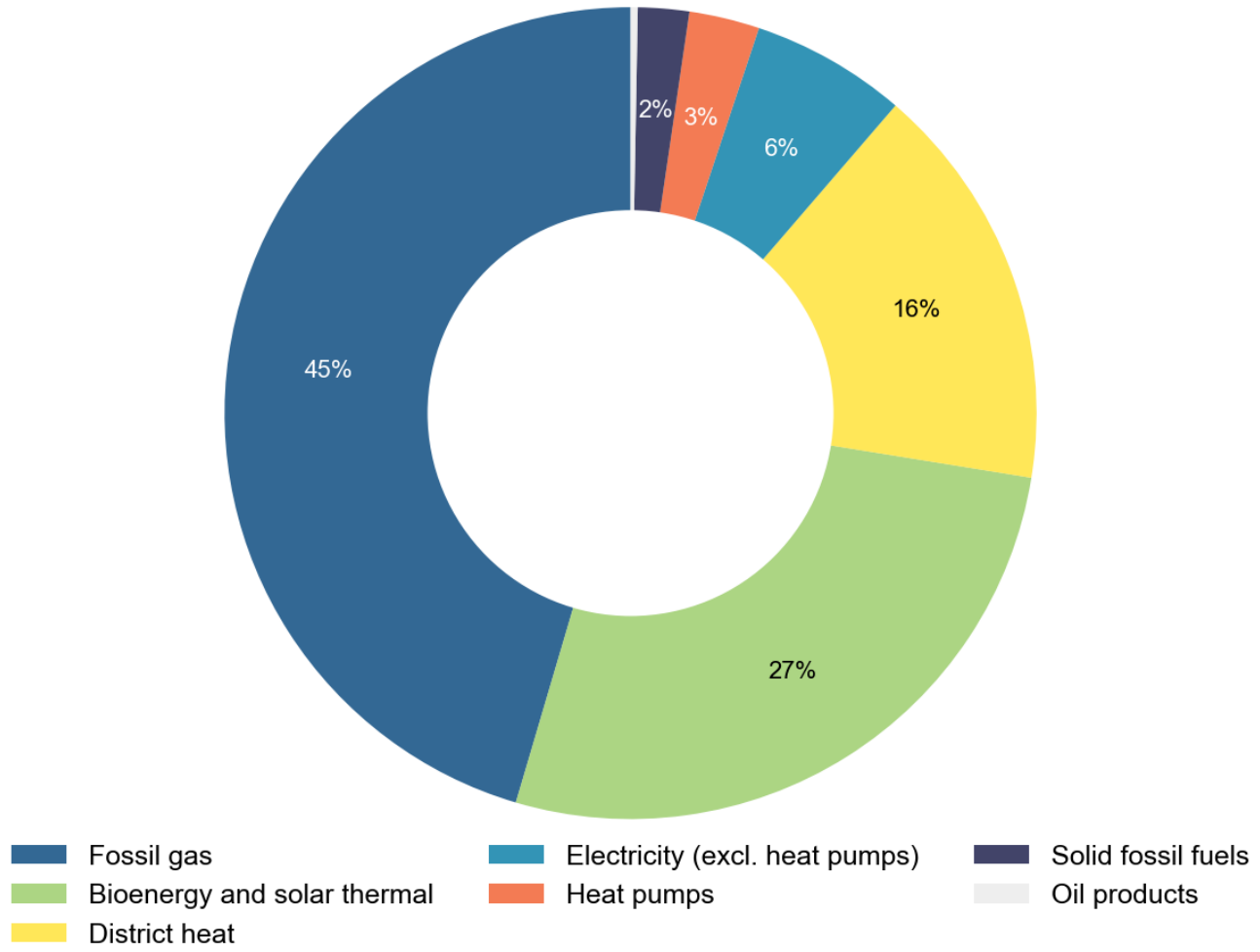
[7] Slovak Republic, 2023.

[8] Eurostat. (2023a). *Disaggregated final energy consumption in households*. https://ec.europa.eu/eurostat/databrowser/view/nrg_d_hhq/default/table?lang=en

[9] Eurostat, 2023a.

[10] Oxenaar, S., Lowes, R. & Rosenow, J. (2023). *Warming up to it: Principles for clean, efficient and smart district heating*. https://www.raponline.org/knowledge-center/warming-up-to-it-principles-clean-efficient-smart-district-heating/

**Figure 1. Energy used for space heating and hot water in Slovakia in 2021**




Note: Values less than 1% are not shown.

Source: Eurostat. (2023a). *Disaggregated final energy consumption in households*.

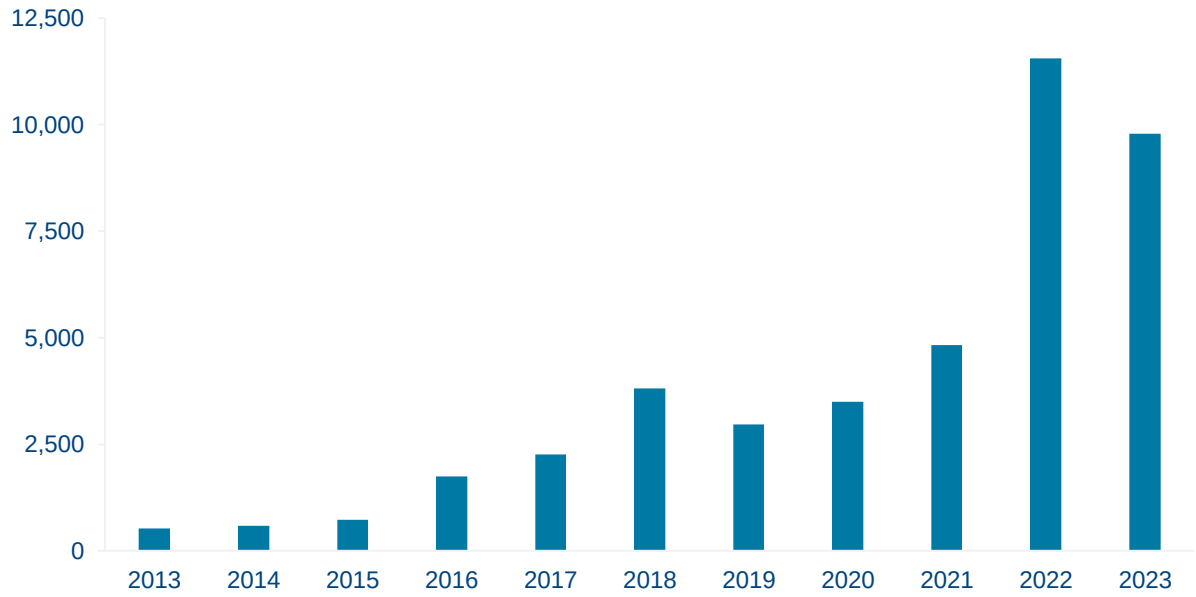
# Market overview

Up until 2022, the Slovak heat pump market grew considerably, as seen in Figure 2.[11] It underwent an increase of nearly 50% from 2020-2021, followed by an even greater surge of 106% into 2022.[12] In 2023, initial estimates show that Slovakia's air-to-water heat pump market declined by around 15%, although it was still twice as high as 2021 levels. At around 14,000 heat pumps sold in 2022 (including hot water heat pumps), Slovakia was the smallest market of the 21 countries reporting to the European Heat Pump Association. In terms of per capita heat pump stock, Slovakia was 20th, leading only the United Kingdom. Virtually all heat pumps sold in Slovakia are air-to-water systems.

[11] European Heat Pump Association. (2024). Market data. https://stats.ehpa.org/

[12] European Heat Pump Association, 2024.

**Figure 2. Annual sales of air-to-water heat pumps in Slovakia, 2013-2023**




Source: European Heat Pump Association. (2024). Market data.

# Economics and market-based instruments

Economic policy can help or harm the affordability of heat pumps. In Slovakia's case, all available market instruments appear to decrease their competitiveness.

Slovakia places taxes and levies on electricity that are roughly three times higher per unit of energy (e.g. per kilowatt hour) than those on gas.[13] Shifting half of the levy burden from electricity to gas could make heat pumps more affordable on a total cost of ownership basis, as shown in the following sections. Moreover, shifting levies to general taxation ensures that low-income families are not additionally burdened when heating inefficient homes. Slovakia does not currently have a carbon tax on heating fuels; this policy lever has been shown to be effective in scaling heat pump markets in the Nordic countries.[14]

To date, Slovakia does not place obligations or portfolio standards on utilities and energy companies to increase the share of renewable heating, such as a clean heat standard. It also does not place energy efficiency obligations on its energy companies, a lever which has been successful in promoting heat pumps in countries such as France.[15]

[13] Eurostat. (2023b). *Electricity prices for household consumers - bi-annual data* [Data set]. https://ec.europa.eu/eurostat/databrowser/view/NRG_PC_204/default/table?lang=en. and Eurostat. (2023c). *Gas prices for household consumers - bi-annual data* [Data set]. https://ec.europa.eu/eurostat/databrowser/view/NRG_PC_202/default/table?lang=en

[14] Lowes et al., 2022.

[15] Gibb, D., Santini, M. & Thomas, S. (2023). *Olympic mindset: Making France a heat pump leader*. https://www.raponline.org/knowledge-center/olympic-mindset-making-france-heat-pump-leader/

Source: John-Fs-Pic, Shutterstock

# Regulatory policy

To spur the uptake of heat pumps, countries have numerous regulatory policy options at their disposal. These include building codes, appliance standards and restrictions, and planning and zoning.

Slovak building codes do not mandate the installation of heat pumps, nor are heat pumps considered as a measure to improve building energy efficiency, as they are not captured in the country's energy performance certificates.[16] Heat pumps can reduce a building's energy consumption for space and water heating by 300% through their efficiency and their ability to significantly reduce primary energy demand. Other countries such as Italy recognise heat pumps as a vital tool to improve building energy efficiency.

There is currently no discussion of restrictions on fossil fuel boiler sales in Slovakia. What's more, distribution companies have been characterised as being "unprepared" when it comes to an accelerated heat pump roll-out.[17] Finally, there is a lack of comprehensive, consumer-centric regulation that supports a transition to electric heating.

[16] BEUC & BPIE. (2023). *Introducing the Heat Pump Readiness Indicator*. https://www.bpie.eu/publication/introducing-the-heat-pump-readiness-indicator-how-to-make-energy-performance-certificates-fit-for-heat-pumps/

[17] Zmušková, B. & Jenčová, I. (2023, 15 June). *Slovakia's gap in heat pump subsidies could 'lose a year' of progress*. Euractiv. https://www.euractiv.com/section/politics/news/slovakias-gap-in-heat-pump-subsidies-could-lose-a-year-of-progress/

# Communication

In Slovakia, a significant barrier to heat pump uptake is communication. Consumers face challenges in accessing and understanding information about heating options, costs and services, and the situation is worsened by monopolistic practices and a lack of transparency. There is limited availability of independent information, making it difficult for consumers to take informed decisions.[18] From the consumer perspective, heat pump technology is complex and requires bespoke preparation for its installation based on the unique requirements of each household. Furthermore, as in many EU countries, there is a notable gap in the availability of skilled professionals capable of evaluating the necessary preparatory measures for heat pump installation.[19]

# Financial support

In recent years, the financial support available in Slovakia for heat pump deployment has been inconsistent. Its subsidy programmes depend heavily on EU funds and are governed by a complicated coordination of three government ministries. Following a switch between policy programming periods, the subsidy programme has been paused since April 2023.[20] Originally scheduled to reopen in September 2023, the programme remains closed to applications as of the time of writing in January 2024. This eight-month pause in financial support could slow the expansion of the Slovak heat pump market.

Even with the subsidy in place, Slovak households face a difficult economic choice. The base support level is calculated based on the Slovak Green Household programme (Zelená domácnostiam).[21] The standard support provided since October 2023 is €380 per kilowatt (kW), with a ceiling of 10 kW. This would mean that the maximum level of support was €3,800 for a 10 kW heat pump, a size that should be sufficient for many household applications. In addition, a 15% bonus is applicable if a solid fuel boiler is being converted to a heat pump.[22]

However, this subsidy level may still prove insufficient. In 2023, the upfront cost of a standard heat pump was estimated at €9,200 compared to a condensing gas boiler at €2,800 (both excluding VAT).[23] Even including the maximum subsidy of €3,800, a heat pump would still cost about 35% more than a gas boiler. The upfront cost hurdle is significant, and the subsidies are particularly insufficient and complicated to access for low-income households.

Under current energy prices, heat pumps also cost more to operate than a gas boiler. Contrary to other European countries, it is not possible for the average Slovak household to

---

[18] BEUC. (2023). *Mystery shopping: Consumer Experiences When Trying to Buy a Heat Pump*. https://www.beuc.eu/reports/mystery-shopping-consumer-experiences-when-trying-buy-heat-pump-executive-summary. Petra Cakovska, S.O.S. Poprad, comments provided to RAP on 11 January 2024.

[19] Orovnický, V., Slovak Association for Refrigeration and Air Conditioning, personal communication with RAP, 17 February 2024.

[20] Zmušková & Jenčová, 2023.

[21] Zelená domácnostiam [Green for Households], https://zelenadomacnostiam.sk/

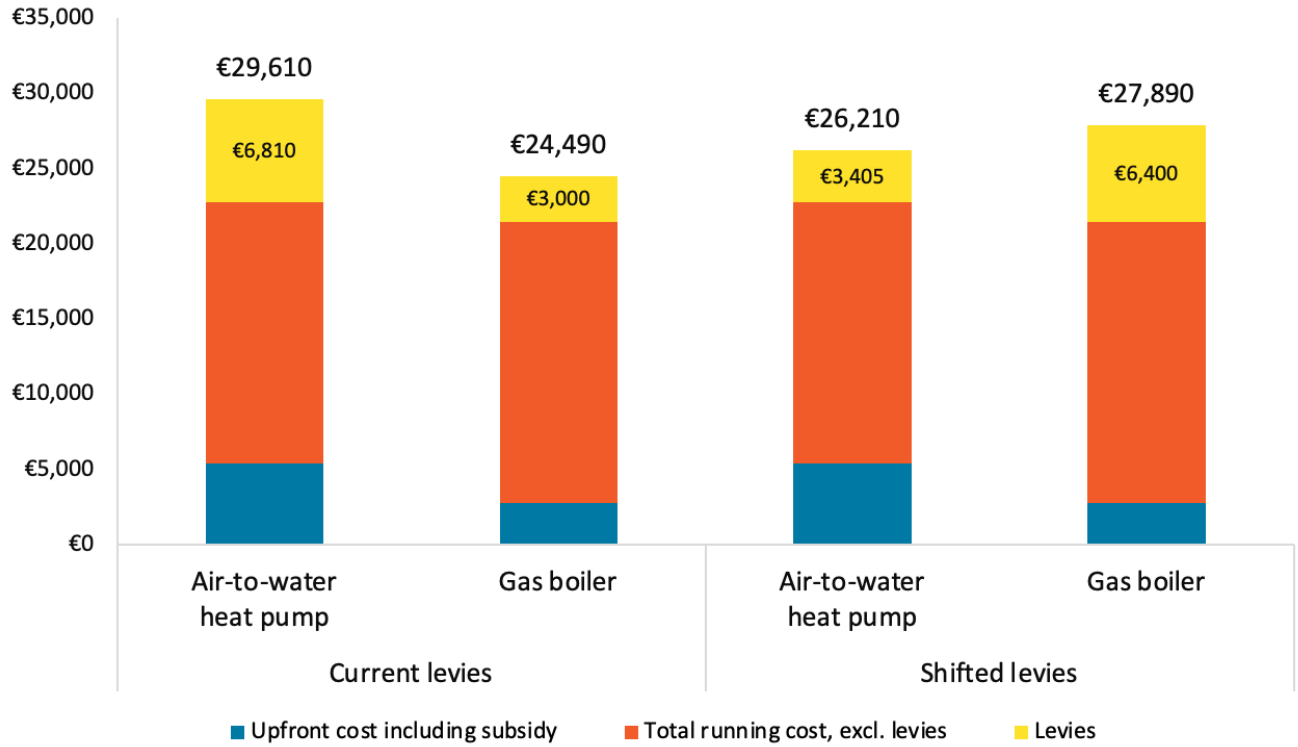
[22] Orovnický, 2024.

[23] Upfront cost information from the Slovak Association for Refrigeration and Air Conditioning.

rely on monthly cost savings to recoup the upfront costs for the heat pump. This is because electricity is currently more expensive than gas. During the first half of 2023, pre-tax electricity cost €132.20 per megawatt hour (MWh) and gas €47.60 per MWh. Once taxes and levies are added, the difference becomes €231.60 per MWh for electricity versus €67 per MWh for gas. Accounting for all costs, Slovak households pay around 3.5 times more for electricity than for gas.

The heavy impact of these taxes and levies on electricity is clear. At €60.80 per MWh, they are significantly higher than those placed on gas (€8.20 per MWh). The administrative charges heavily skew the economics against heat pumps. As shown in Figure 3 below, if half of the tax burden on electricity was shifted to gas, the total cost of owning a heat pump would be lower than owning a gas boiler, resulting in savings of €257 per year and enabling a payback duration of around 11 years.[24]

**Figure 3. Impact of shifting levies on total cost of ownership of a heat pump and a gas boiler**




Source: Eurostat. (2023a). *Disaggregated final energy consumption in households* [Data set], Eurostat. (2023b). *Electricity prices for household consumers - bi-annual data* [Data set], and Eurostat. (2023c). *Gas prices for household consumers - bi-annual data* [Data set]. Calculations detailed in Annex 1.

[24] Eurostat, 2023a, Eurostat, 2023b and Eurostat, 2023c. For a detailed description of the calculations, please see Annex 1.

# Recommendations

For Slovakia to significantly grow the adoption of heat pumps and transition away from fossil gas heating, it is crucial to rebalance electricity and gas prices, particularly by adjusting levies. This would improve the economic viability of heat pumps, making them a more attractive option for homeowners. High energy prices, especially for electricity, currently act as a deterrent to the adoption of heat pumps and remove the possibility of compensating for a higher upfront cost through annual savings.

If these costs are reduced, perhaps through revising tax structures or offering targeted rebates on electricity used for heat pumps, operating costs become more competitive. This price adjustment would not only encourage consumers to opt for more sustainable heating solutions but would also align with broader environmental and energy objectives at EU level, as heat pumps are more energy-efficient and have a lower carbon footprint than traditional gas heating.

While rebalancing energy prices is the most important recommendation, Slovak consumers would also benefit from stabilised and possibly increased subsidies for heat pumps. These subsidies should be structured to avoid funding gaps, ensuring continuous availability to consumers. This approach would alleviate the financial burden of transitioning to heat pumps, making them accessible to a broader segment of the population. Importantly, these subsidies should be at a sufficient level with a programme design that specifically targets low-income households, which are often the most affected by high heating costs and the least able to invest in energy-efficient technologies. Such targeted subsidies would not only provide immediate financial relief but would also contribute to long-term predictability and stability in the heating market. This predictability is essential for both consumers and suppliers, as it allows for better planning, investment, and a smoother transition from fossil gas to heat pumps.

Ambitious regulation, such as a restriction on gas boilers in new buildings or the introduction of a clean heat standard for industry, could further accelerate this transition. Clean heat standards would provide clear visibility for the development of a heat pump market and facilitate an end date for the sale of fossil boilers.[25]

By focusing on these strategies, Slovakia can foster a rapid uptake of heat pumps.

[25] Santini, M., Cowart, R., Thomas, S., Gibb, D., Lowes, R. & Rosenow, J. (2023). *Clean heat standards: New tools for the fossil heat phaseout in Europe.* https://www.raponline.org/knowledge-center/clean-heat-standards-new-tools-for-fossil-fuel-phaseout-in-europe/

# Annex 1. Total cost of ownership methodology

Calculations presented in this paper show the total cost of ownership for an air-to-water heat pump and a gas boiler, as depicted in Figure 3. 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).[26] The average space heating demand per country was divided by the number of households, to reach an average space and water heating demand per household in Slovakia.[27]

## 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%.

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.[28]

The efficiency value used in this study may also be generous towards gas boilers, considering it corresponds to the minimum as defined by Appendix X in the European Commission's Energy Efficiency Directive guidance note.[29] The existing fleet of boilers in Slovakia is not comprised exclusively of the most energy-efficient options, and would therefore likely operate at a fleet efficiency much lower than 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 the Slovak Association for Refrigeration and Air Conditioning were used. These values were €11,500 for an air-to-water heat pump and €3,500 for a gas boiler. A subsidy of €3,800 was applied to the heat pump, assuming a 10-kW system and €380 per kW as provided by the Slovak Green Households programme. No subsidy was applied to the gas boiler.

---

[26] Eurostat, 2023a.

[27] Eurostat. (2023d). *Number of households by household composition, number of children and age of youngest child* [Data set]. Accessed 7 September 2023. https://ec.europa.eu/eurostat/databrowser/view/lfst_hhnhtych/default/table?lang=en

[28] International Renewable Energy Agency (IRENA). (2022). *Renewable Solutions in End-Uses: Heat Pump Costs and Markets*. https://www.irena.org/Publications/2022/Nov/Renewable-solutions-in-end-uses-Heat-pump-costs-and-markets

[29] European Commission. (2019). Annex to the European Commission Recommendation (EU) 2019/1658 of 25 September 2019 on transposing the energy savings obligations under the Energy Efficiency Directive. https://eur-lex.europa.eu/eli/reco/2019/1658

# Operating costs

In terms of operating costs, the price of fuel plays the greatest role. The fuel prices used in this paper are from Eurostat.[30] The retail electricity price was derived from the average price for the first half of 2023: €132.20 per MWh before levies and VAT. The retail gas price was the average price for the first half of 2023: €47.60 per MWh before levies and VAT.

Levies were also taken from Eurostat. The "current levy" used for electricity was €60.80 per MWh, and for gas €8.20 per MWh. The "shifted levies" scenario removed 50% of the total cost of electricity levies from the heat pump and moved these to the gas boiler. This amount was €3,405 over the life of each device.

Maintenance costs for the heat pump were assumed at €144 per year, and for the gas boiler at €72 per year. An 18-year device lifetime was applied to both heat pump and gas boiler, each with VAT of 20%.

[30] Eurostat, 2023b and Eurostat, 2023c.


**Regulatory Assistance Project (RAP)®**
Belgium · China · Germany · India · United States

Rue de la Science 23
B – 1040 Brussels
Belgium

+32 2 789 3012
info@raponline.org
**raponline.org**