GREEN HEAT FOR ALL 2

A review of the necessity and feasibility of a just and green heat transition

coolproducts
for a cool planet

The study has been carried out by **INFORSE Europe**

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table of CONTENTS

NECPs not ambitious at all on clean, renewable heating

We analysed how Member States plan to transform the heating sector based on their National Energy and Climate Plans (NECPs), especially in terms of greenhouse gas emissions and renewable energy sources, including ambient heat (and related heat pump technology). By 15 August, 2023, only documents from 12 countries were available on the official EU website; hence, for the missing countries, we used the previous NECP data as a baseline, and Fit for 55 expectations were applied.

The NECP drafts are extremely different from one another, and some lack even the most basic information, such as the expected share of renewable energy in heating and cooling (H&C).

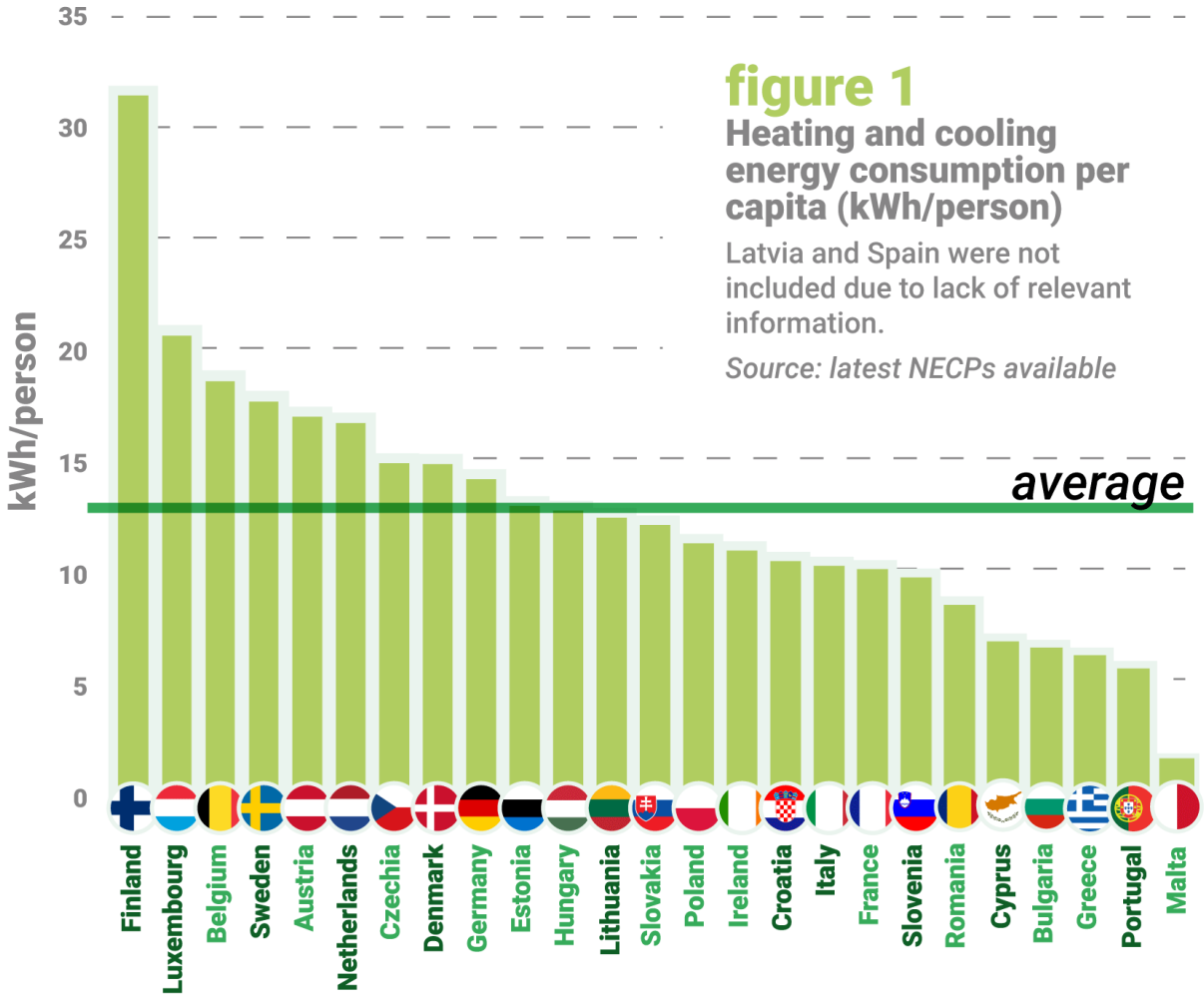


figure 1
Heating and cooling energy consumption per capita (kWh/person)
Latvia and Spain were not included due to lack of relevant information.
Source: latest NECPs available

new NECPs are in dark green

If we consider the new draft NECPs presented, a 25.5% reduction in the energy consumption for heating and cooling (H&C) in 2030 is the average target. The average share of renewable energy in H&C is currently 29%: with Belgium, the Netherlands, and Ireland as the worst performers, all scoring below 10%; Estonia, Finland, and Latvia scoring above 50%; and Sweden leading the ranking with more than 60%. The trend in the NECPs is clear, and the share of renewables in H&C is expected to increase from 29% to 41% by 2030. However, several differences exist between Member States (MSs) in terms of the robustness of the target. Luxembourg (from 12.9% to 40.3%) and Ireland (7.8% to 24%)

"The share of RES in heating & cooling is expected to grow from 29% to 41%"

have the highest planned growth targets, with goal of three–four times the current share of renewables in heat production. The 1.5-2-fold commitments of Hungary, Italy, Slovakia, and Spain are also significant. Denmark has a similar commitment, but this is particularly noteworthy, as this Nordic country has set itself the target of significantly increasing the inherently high rate from 42% to 77%.

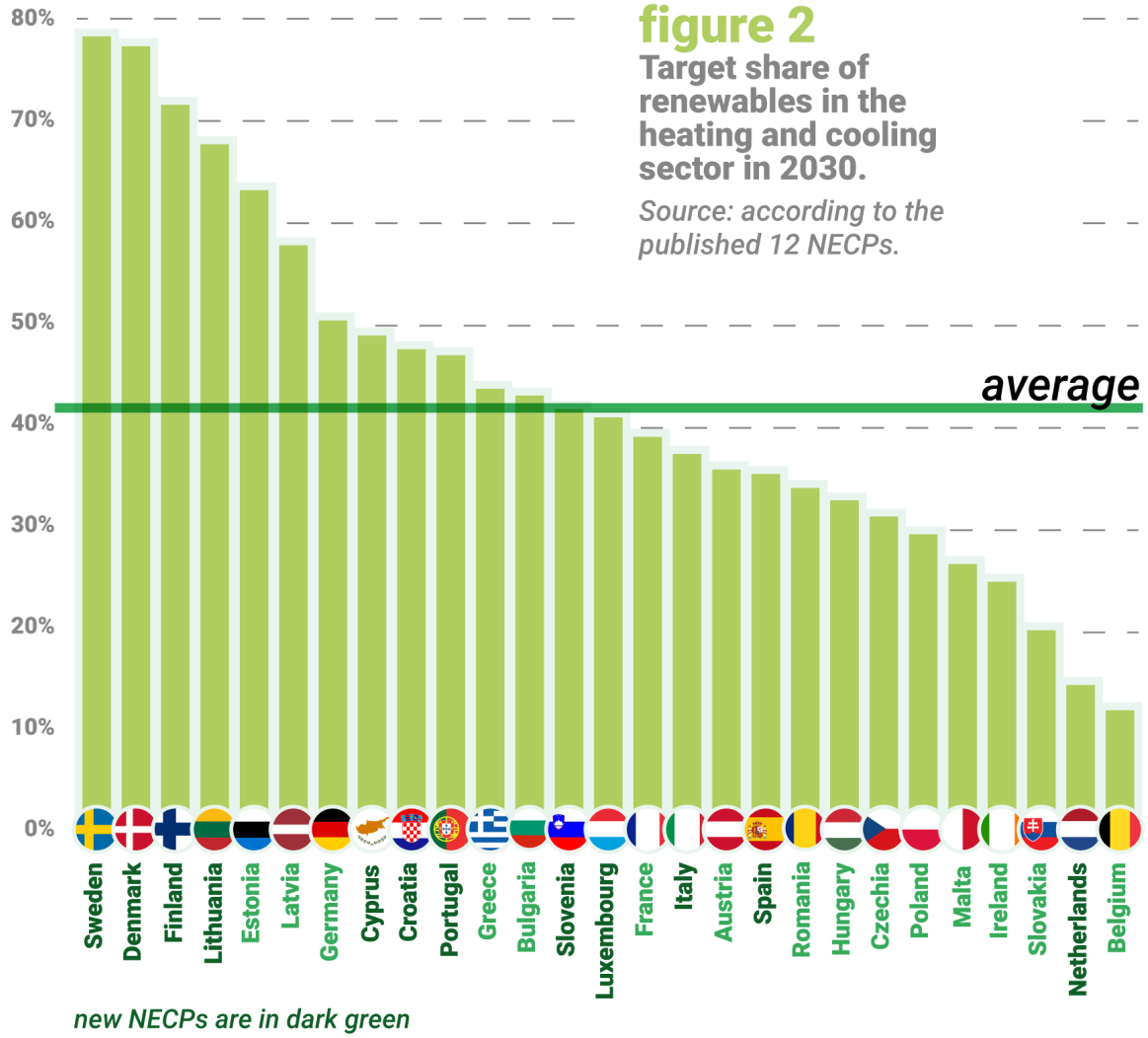
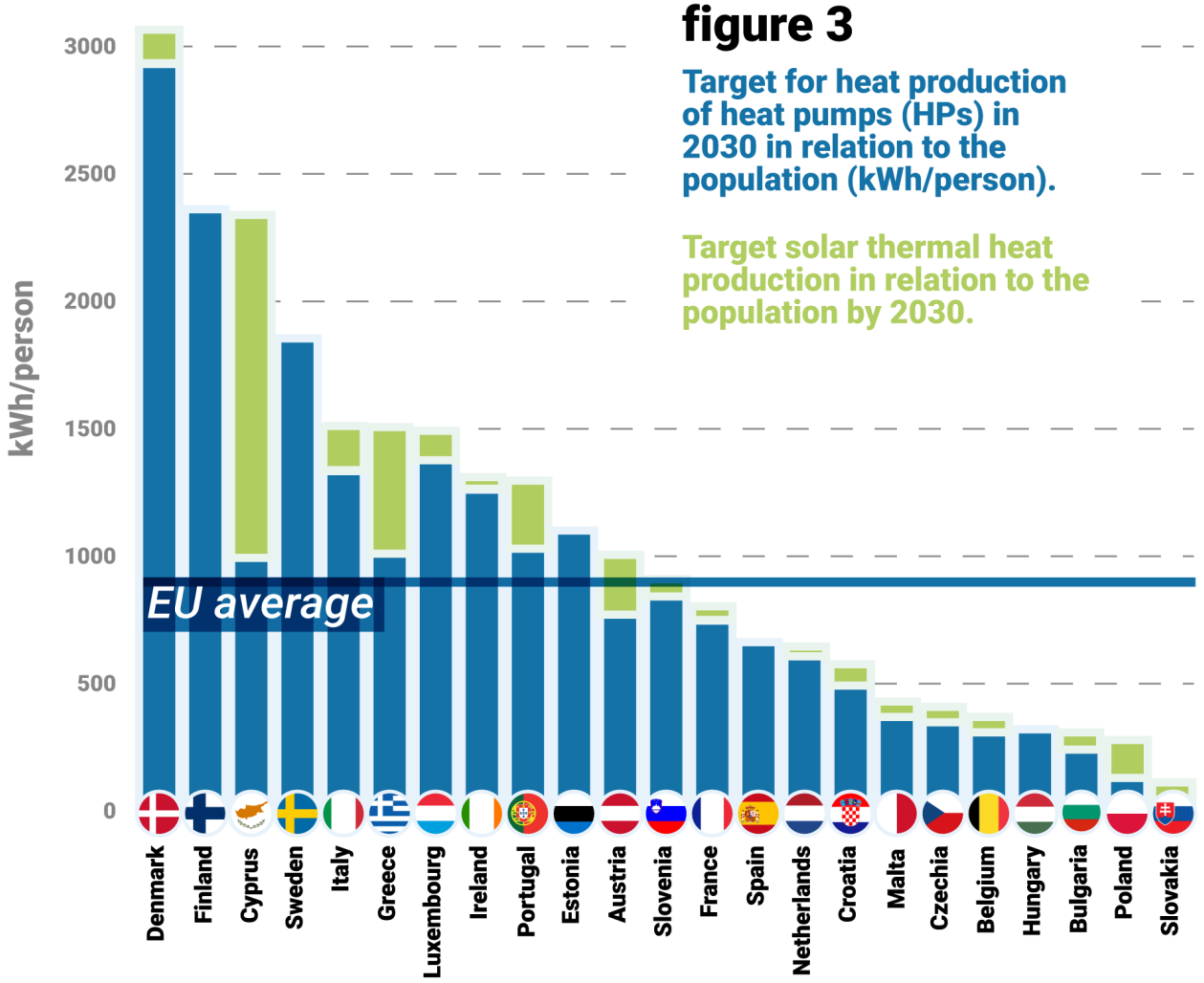


figure 2
Target share of renewables in the heating and cooling sector in 2030.
Source: according to the published 12 NECPs.

The average energy production per capita in the drafts presented thus far indicates 927 kWh/y for heat pumps and 174 kWh/y for solar thermal, with large differences between MSs Remarkably, the most ambitious plans are those from the coldest regions, confirming that heat pumps can now deliver well, even under harsh climate conditions. On the other end of the spectrum, Eastern European countries are overly reticent to adopt this technology, particularly Poland, despite having a very dynamic heat pump market and Bulgaria, whose solar yield is particularly relevant. Belgium again scores among the least ambitious plans with no plausible reason.
For solar thermal, it is not surprising that

"the most ambitious heat pumps targets are those of the northern countries"

Mediterranean countries such as Cyprus and Greece are leading the list together with Portugal, as irradiation is at its peak in this area, but it is surprising to see France, Croatia, Bulgaria, and especially Malta setting targets well below the European average, even though their natural conditions would allow for much more ambition. Among non-Mediterranean countries, Poland, Ireland, and Austria have the highest targets.



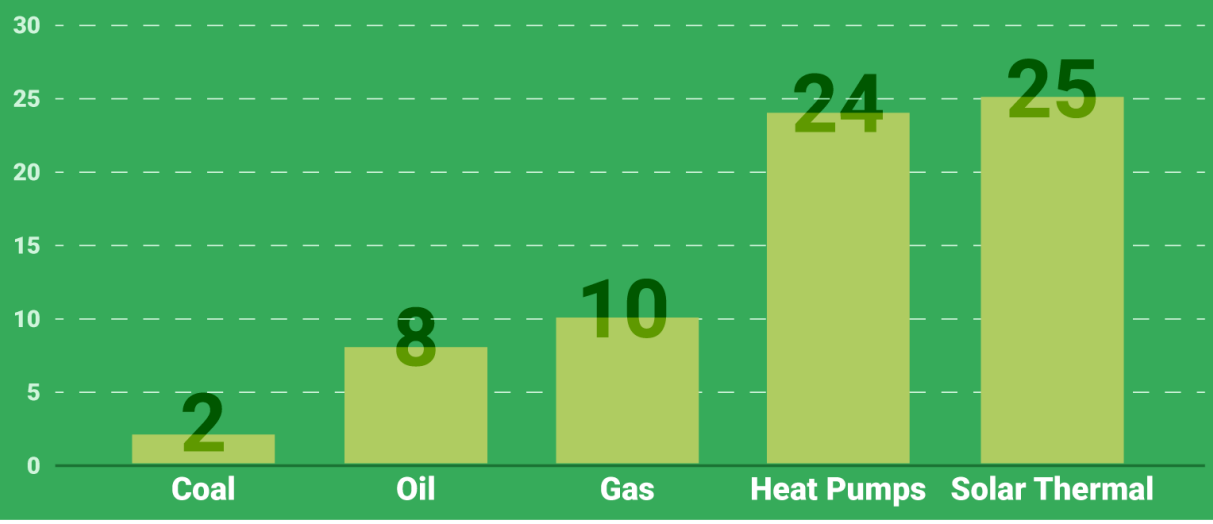
10 countries still support fossil heating

With 10 countries still supporting fossil fuels in heating one way or another, the EU is still very far from getting rid of fossil fuels in the near future within this sector. Some countries only have minor subsidies (such as fiscal deduction of the installation works in Sweden) and some have pledged to stop them in 2023 (France); others like Italy and Poland still generously finance the installation of condensing fossil boilers.

It is worth noting that from our latest analysis "Mission Possible" the support for fossil fuel heating was a staggering €3.2B in 2022 among European countries.

"Italy and Poland still generously finance fossil fuels' boilers"

figure 4
Number of countries subsidizing heating systems



The cost of heat pumps is very different from country to country

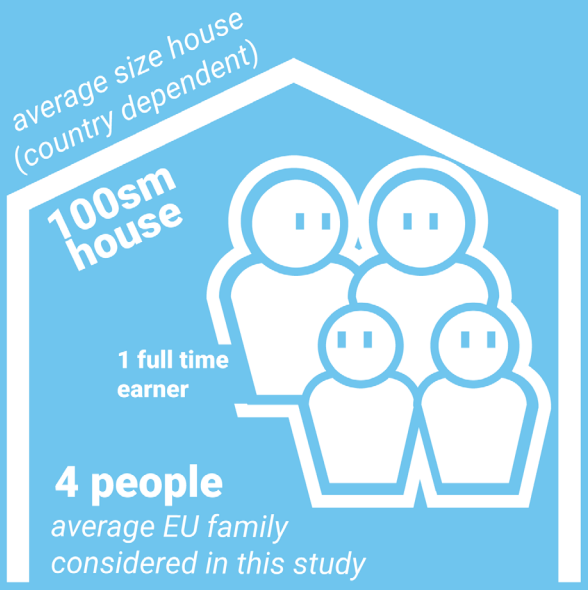
While the cost of renewable heating technology, such as heat pumps and solar thermal, has only minimal variations between countries, labor cost might have a much higher impact on the total cost of installation of these technologies.

However, what makes a real difference is the perceived cost of such technologies when related to the average salary. We took a mid-to low-income household as a reference in all analysed countries, and we looked at the number of full-time monthly salaries needed to cover the cost of a Heat Pump. Similar to the famous hamburger index used to benchmark economies, this Pump Index roughly indicates the gap in affordability of these technologies across the EU, a gap that is only partially alleviated by differences in energy costs and local subsidies.

For some countries with limited heating demand, we considered that the obvious renewable alternative is not a heat pump for a water-based heating system but air-air heat pumps combined with solar thermal energy for hot water. This is the case for Cyprus, Malta and parts of Portugal, Spain, France, Italy, and Greece.

A comparison of the investment in a fossil heating alternative (condensing gas boiler) and a renewable alternative (air source heat pump) after factoring in the incentives is shown in the graph. Unfortunately, the upfront cost of heat pumps is still much higher than that of gas boilers in many countries.

Especially in Bulgaria and Romania, the upfront cost for a heat pump is very high, that is, about a year (12 months) of income, which is a result of a combination of non-existent or very poor support by the state authorities for this technology and lower average salaries.



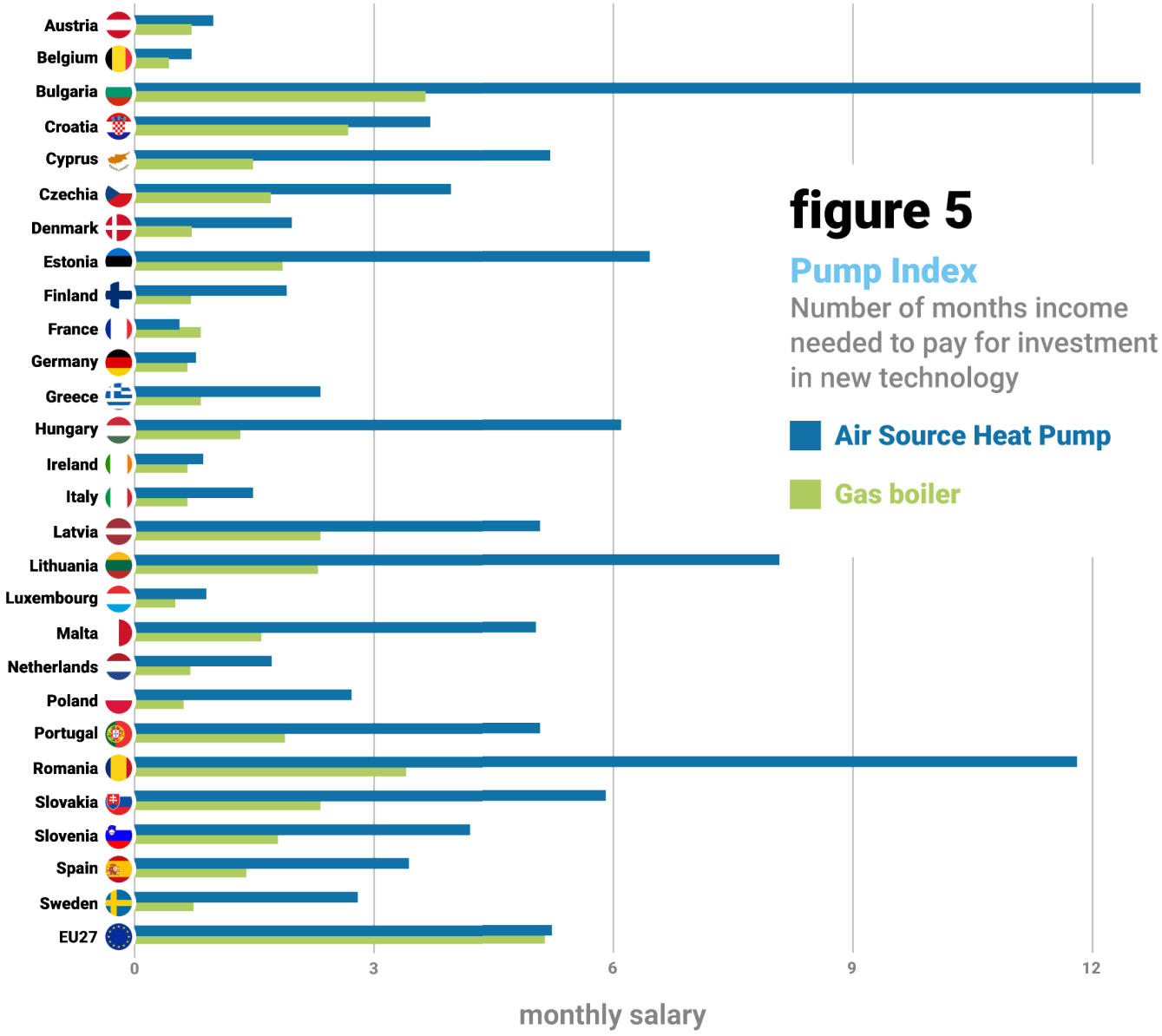


figure 5

Pump Index

Number of months income needed to pay for investment in new technology

Air Source Heat Pump

Gas boiler

Electricity bills must become lower!

Another relevant aspect for the affordability of the investment are the energy prices.

These also vary among the EU countries with gas ranging from 3 to 14 €cent/kWh and electricity prices ranging from 8 to 25 €cents/kWh. To make a heat pump economically attractive, compared to gas (or oil in countries where this is the standard heating fossil fuel), according to our calculation, the electricity must not be more than 3.6 times more expensive than its fossil counterpart. This ratio is exceeded in five countries, while in two, it is very close to 3.6.

This leads to significantly higher running costs than the optimal ones. With a higher running cost, the payback time extends and the economic interest in investing in heat pumps decreases, making the engineering of innovative finance around these technologies more difficult.

"Belgium is the only country where running a gas boilers is cheaper, unless one coupled heat pumps with solar"

Remarkably, Nordic countries ranked the most HP-friendly electricity markets, together with Malta and Portugal. On the other side of the chart, Belgium confirms its last position as the least favorable country in the EU to run a heat pump and the only country where this ratio exceeds 5; hence, the only country running a fossil boiler is cheaper (unless the heat pumps are combined with self-consumption of solar energy). ***- see figure 7***

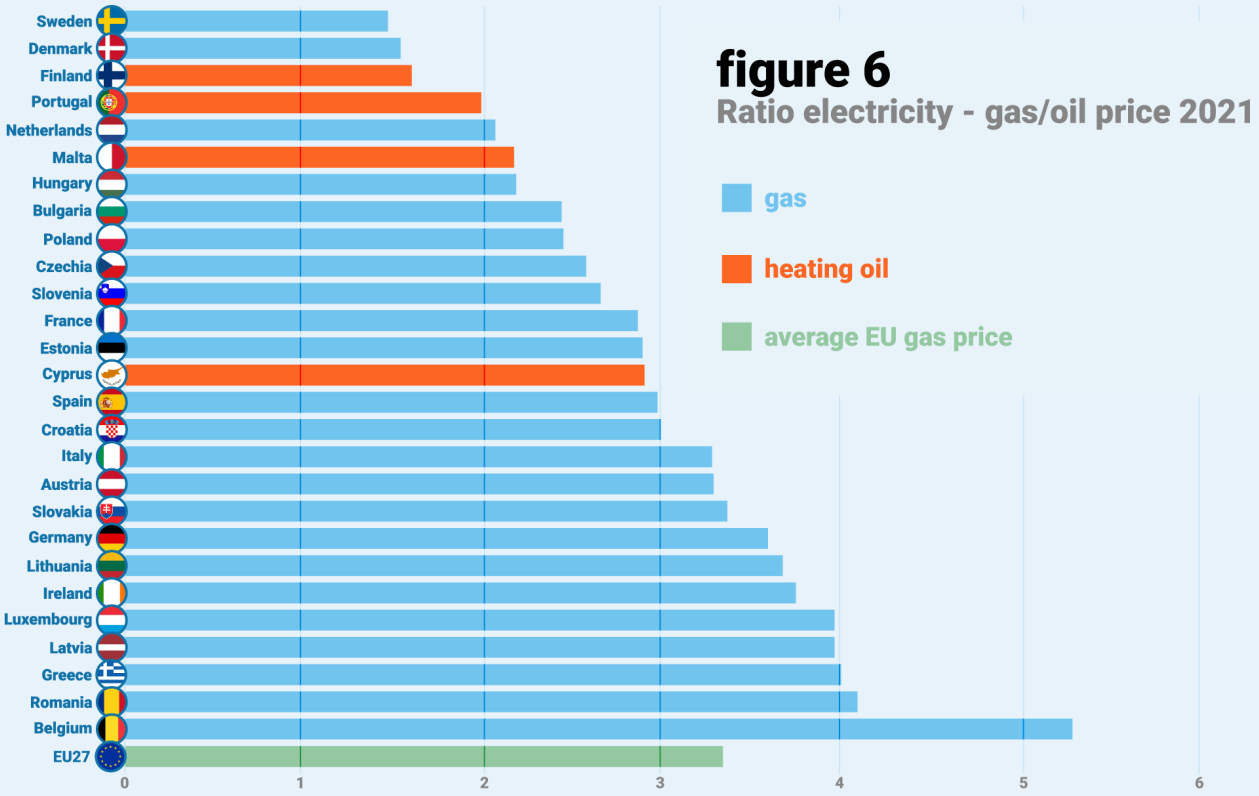


figure 6
Ratio electricity - gas/oil price 2021

Heat pumps are already competitive with fossil heating in several countries

This is also reflected in the following chart, in which we analyse and compare the running cost of operating a new gas boiler, which is on average higher than that of an air source heat pump system. We used standard tariffs over the lifetime of the heating technology, taking into consideration the prevailing heating fuel in the country and the standard consumption of our target household. In addition to the special case of Belgium, it is worth noting that the situation is less than optimal in Greece, Latvia, Lithuania, and Romania, where the yearly running costs for heat pumps are only slightly lower than those for gas boilers, over their lifetime.

However, with Greece as an exception, the countries with the highest benefit from the switch to heat pumps and solar are the southern ones, and in the four warm countries (Malta, Cyprus, Spain, and Portugal), it is much cheaper to use air-air heat pumps combined with solar thermal than fossil fuels for heating. Finally, In Finland, Sweden, Denmark, and Netherlands, it is considerably cheaper to use heat pumps for heating than boilers.

"MT, CY, ES and PT are the countries where the switch to heat pumps & solar is the most advantageous"

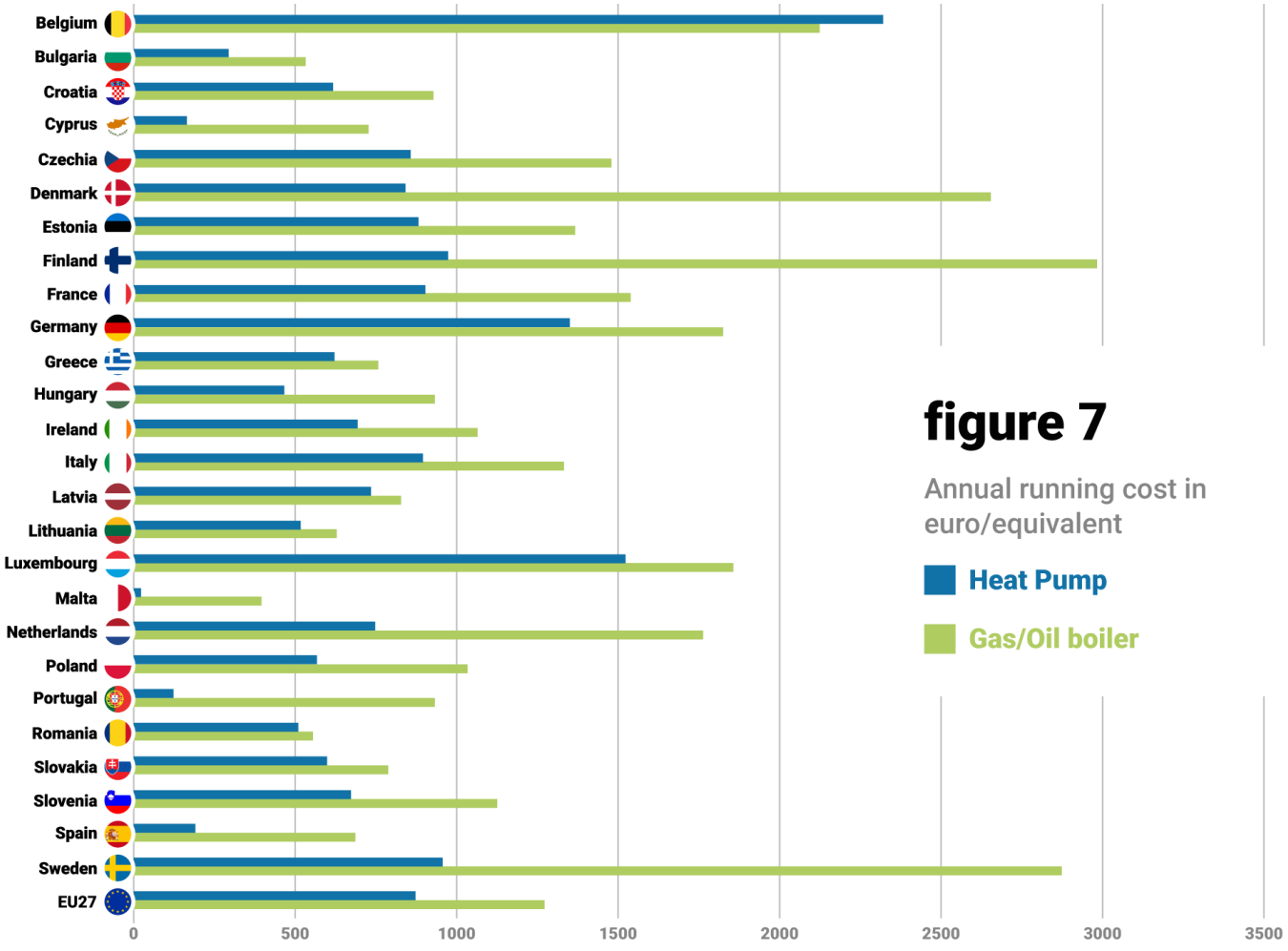
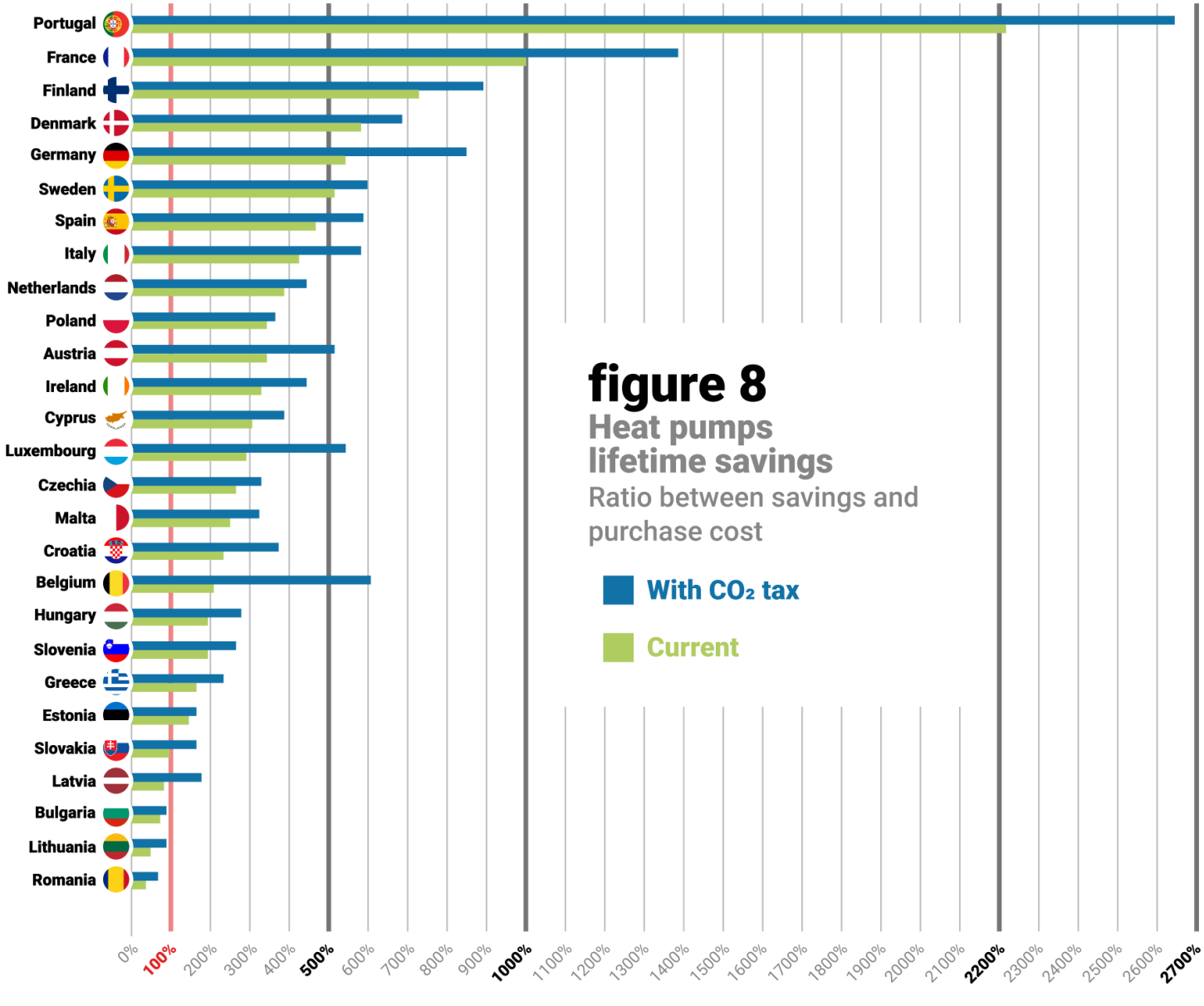


figure 7

Annual running cost in euro/equivalent

based on the average energy cost over the lifespan of the technology

The savings from using a heat pump are different from country to country and it is worth stressing that in 5 countries (Romania, Lithuania, Bulgaria, Latvia and Slovakia) the technology does not generate enough savings to payback itself yet. Portugal, with high incentives and high savings, is the country where renewable heating brings the highest economic benefits.

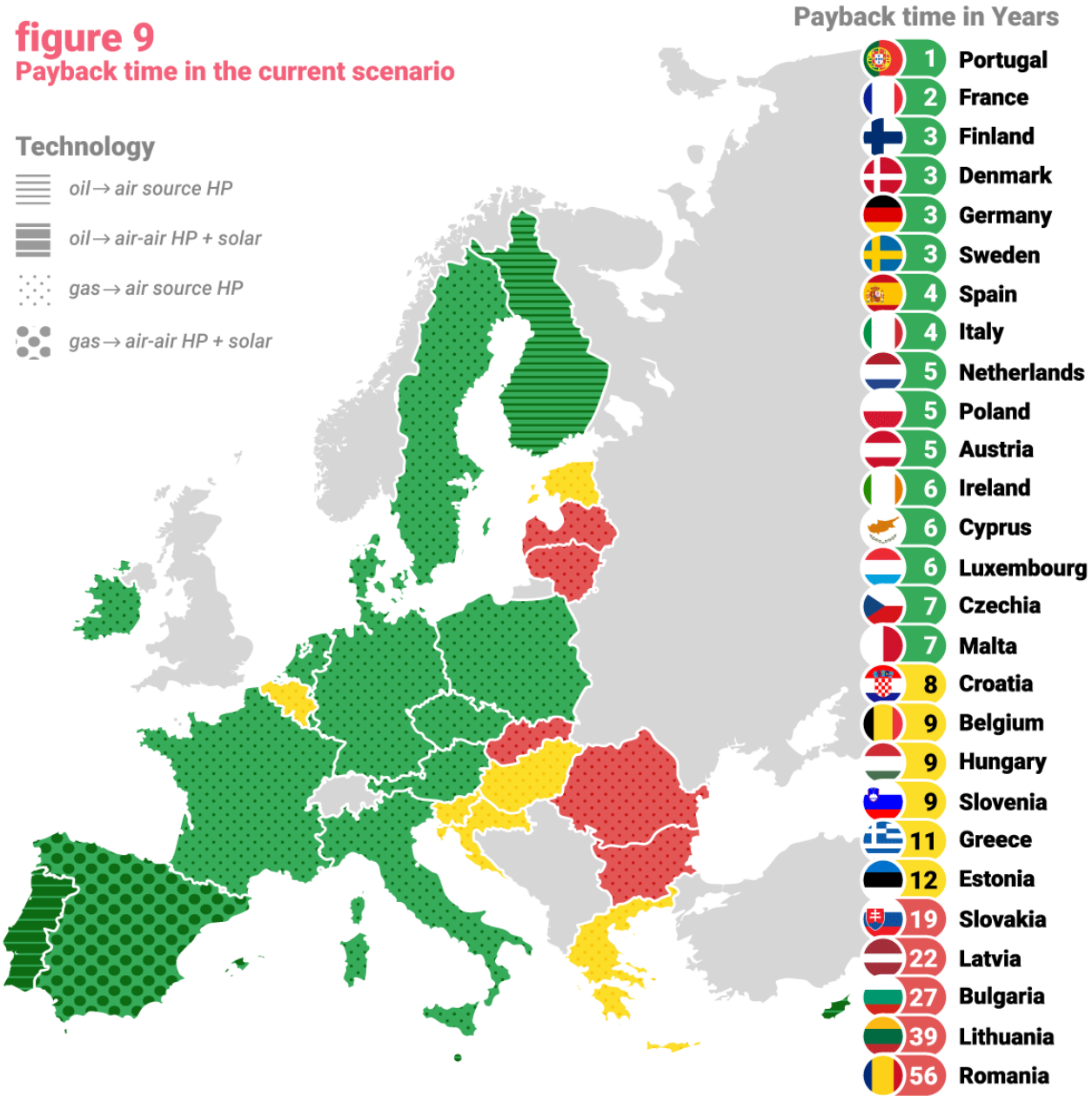


The payback time of heat pumps with the existing subsidies and current energy prices in 16 countries remains within seven years. In six countries, the payback varies from 8 to 12 years, whereas in five other countries, the payback time exceeds the lifetime of the product.

The infographics indicate the type of technology adopted for every country, the type of prevailing fossil fuel currently used for heating, and the amount in millions of euros of extra funding to be put forward on top of the current subsidies (where available).

"With current subsidies, the payback of heat pumps is shorter than 7 years in 16 countries"

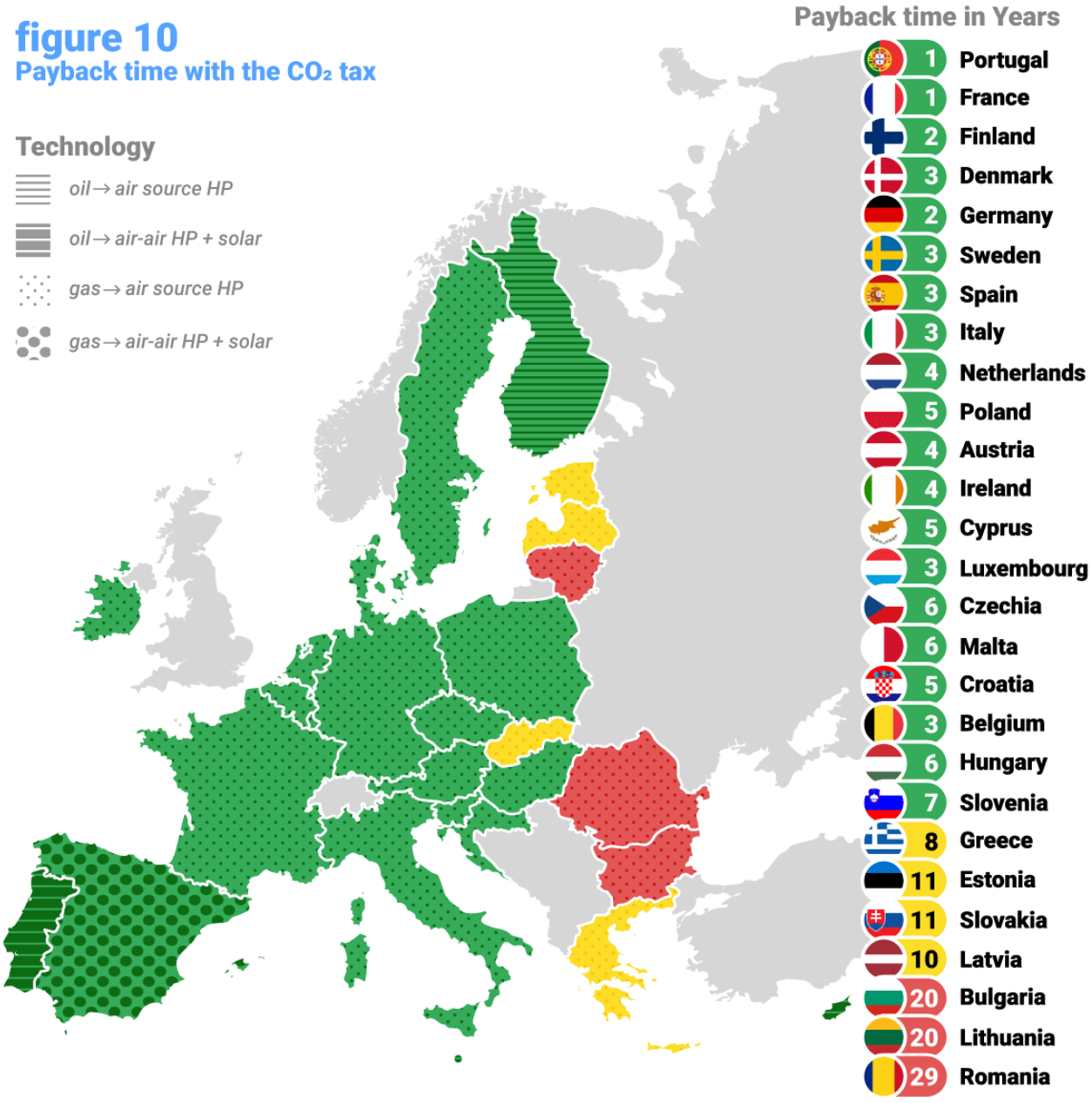
figure 9
Payback time in the current scenario



If we consider a scenario where a CO2 tax of €100/T is included (based on possible evolutions of ETS2 in the case of slow action by Member States that would lead to a high demand for certificates), the number of countries where the technology pays back within seven years increases to 20. Four more countries have payback times between 8 and 10 years, while Bulgaria, Lithuania, and Romania would still not have a payback within the lifespan of the heat pump, arguably due to a lack of sufficient incentives.

"CO_2 pricing would bring the payback within 7 years in 20 countries"

figure 10
Payback time with the CO_2 tax

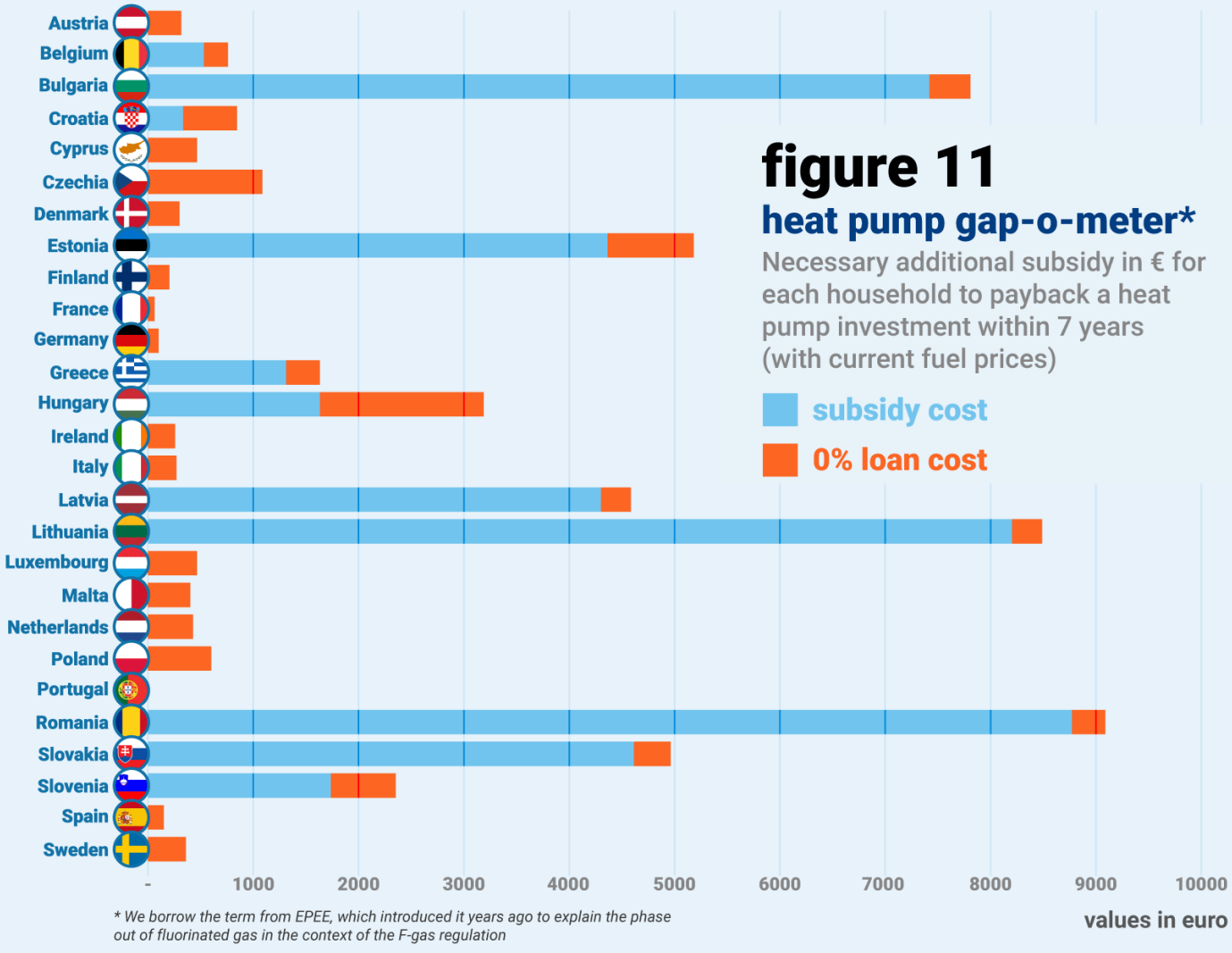


The final mile: renewable heat for all with need €21B

In order to make sure that all European households are able to invest in airborne heat pumps with a payback of 7 years or less, we need to determine the extra economic effort required to close the gap and bring all households within an acceptable payback time. To address this, we have developed a tool called the heat pump gap-o-meter, which calculates the number of boilers present in each country and estimates the cumulative expenditure required to decarbonise the sector by 2040. This will help us to reach the objectives outlined in the Paris Agreement, which aims to limit the world's temperature to 1.5° C.

The total cost required to achieve this goal, which would decarbonise all individual and collective heating systems with the exception of the biomass and district heating systems, is approximately €21.3B[1]. This amount also includes the cost of interest for zero-interest loans that would be granted to low-income or impoverished households, who would otherwise struggle to access credit and cover the upfront cost.

"The Gap-o-meter indicates that with extra €21.3B we would decarbonise heating & cooling"



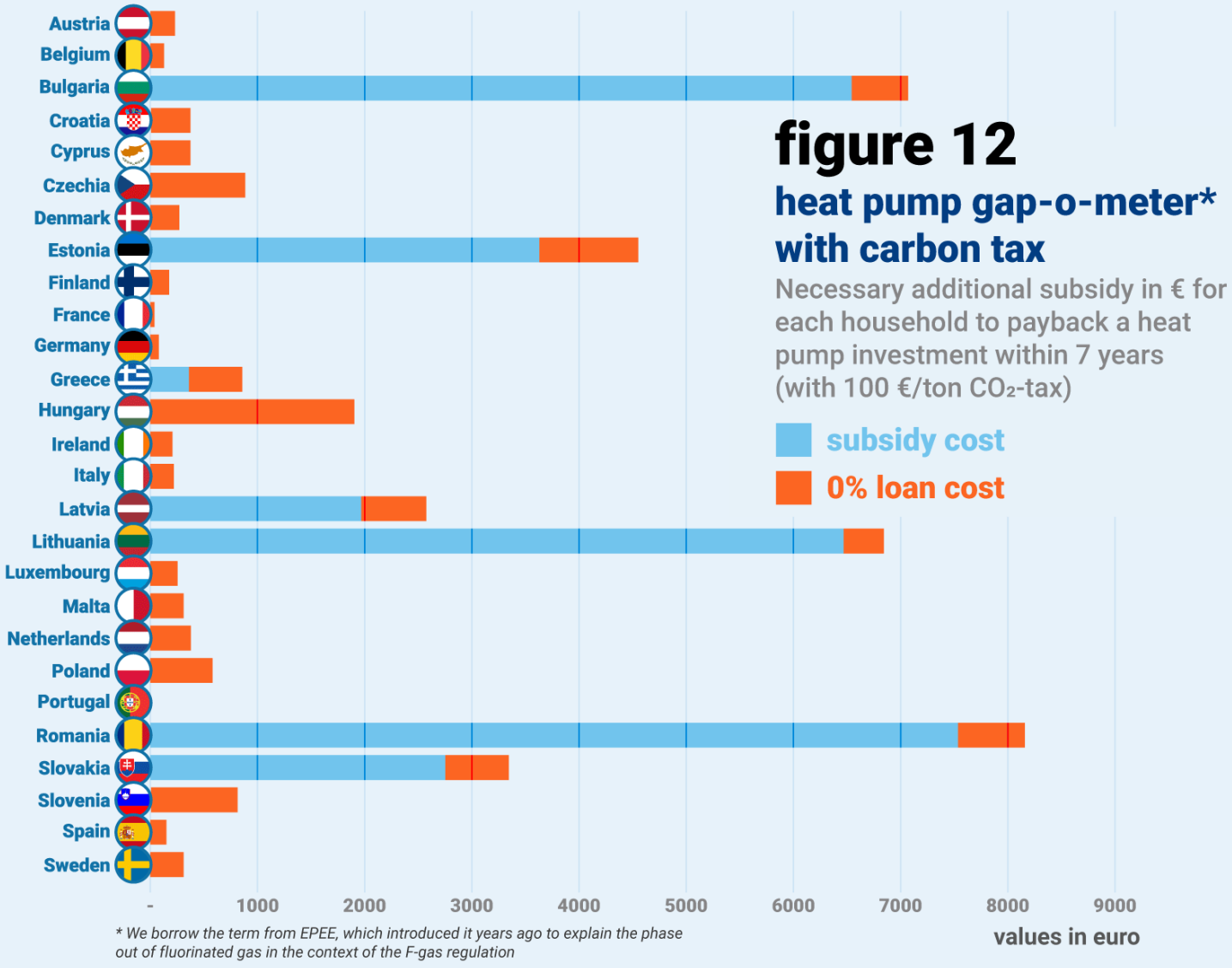
[1]The only countries not included in this figures are Portugal, Slovenia and Lithuania, for which we could not find the exact number of installed boilers. We think that these countries's figures would not change importantly the general picture.

The cost of the inclusive scenario would vary across Member States, with those countries where the payback is already sufficient requiring only the payment of interest on loans for low-income households. In those countries where the payback is very long, due to the lack of subsidies or insufficient subsidies, the sums needed to cover the grants would be higher. Remarkably, in those countries where annual savings are low and there are little to no subsidies at present day, households would need a grant close to 100% and the role of loans would more limited (I.e., LT, RO).

However, if Carbon Taxation is introduced, the cost of the inclusive scenario would be reduced to approximately €14B. It would not make a difference, though in those countries where the electricity is based almost entirely on fossil fuels (I.e., BU, RO).

"A CO_2 tax would bring down the heating & cooling decarbonisation to €14B"

Lastly, it is important to note that this analysis does not take into account factors such as the lack of skilled professionals, limited production capacity of European heat pump factories, and the relatively low acceptance of these technologies in some countries, and that these issues, which we believe can be positively sorted, will need to be factored in when designing policies.



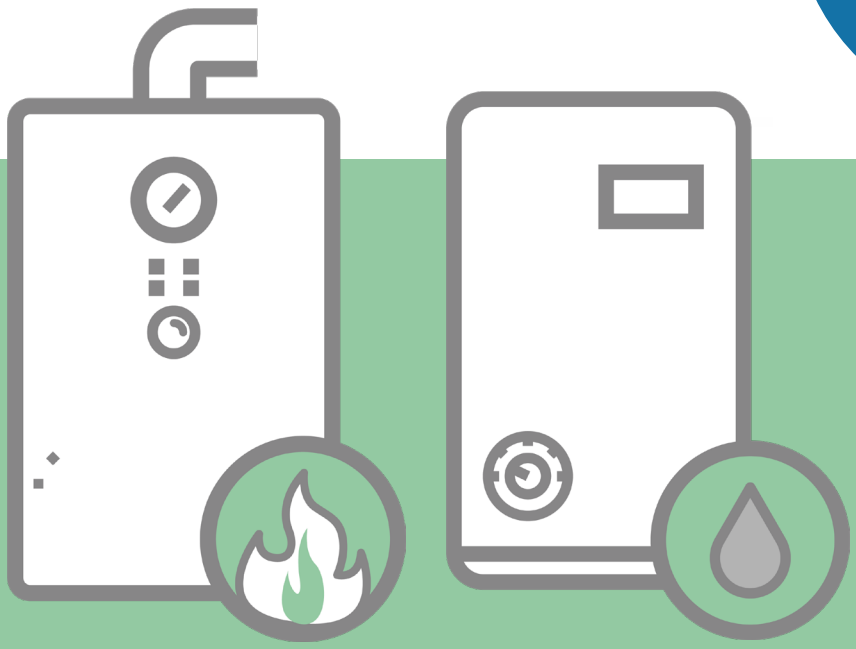
[1]The only countries not included in this figures are Portugal, Slovenia and Lithuania, for which we could not find the exact number of installed boilers. We think that these countries's figures would not change importantly the general picture.

We can theoretically decarbonise our homes by 2030

Looking at the economic figures alone, we can see that an ambitious decarbonisation of the heating sector is not only necessary but also largely possible. The yearly expenditure required to achieve this goal over a period of 15 years would be €1.42B, which is lower than the estimated fossil fuel heating expenditure of €3.2B in 2022

In other words, if we stop funding fossil fuels and invest that amount of funds in renewable heating, we could potentially decarbonise the whole heating stock by 2030, covering 100% of the upfront cost for the 30% of boiler users who are low-income or impoverished.

"In 2022 the EU spent for fossil heating twice the sum needed to decarbonise all domestic heating & cooling"



We need:

1. The immediate end to fossil heating technologies subsidies
2. Staged phase-out of fossil boilers in the market asap
3. Adequate support for technology switch for all households
4. More ambition in the NECPs

Methodological Note

All data are sets are from Eurostat unless otherwise specified. The average monthly income, average house size, average energy consumption, loan interest rate figures are localized by country. The cost of labour for the installation, was kept the same across the EU for lack of detailed information. We identified the mid-to-low household as the one typically needing support but still able to invest a modest sum. We considered that 30% of the population would not be in a condition to make any investment and needed 100% full support. The costs of technologies and their efficiency are taken from the ecodesign preparatory study.

In the total EU cost of decarbonisation Portugal, Lithuania and Slovenia costs are missing, because we could not find the exact number of boilers installed. These countries figures are expected to be modest and not influencing the general picture.

Annex 1:
list of national subsidies

This is the fourth update of our analysis of the existing heating subsidies in the EU.

Please note that some countries marked in red such as Germany or Sweden have very limited fossil heating support, either because they have only regional schemes supporting fossil fuels (DE) or because the financial support is minimal (SW). For the sake of this report we considered hybrid heat pumps as renewables and did not mark as red some Member States that have specific support for this technology (AT and NL). Please note that we only added regional funding where we were able to identify them.

Annex 2:
analysis of the NECPs

This is our first analysis of heating and cooling provisions in the NECPs. Please note that we have considered the drafts that been presented before August 15th, 2023, hence 12 NECPs. For the other countries we used the existing NECPs.

LINK

Annex 3:
national NECPs analysis with charts

To complement our general analysis, we provide some short comments and a few charts from the targets included in the national NECPs (where applicable/available)

LINK

Annex 4:
Methodological note from INFORSE

LINK

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