GREEN HEAT FOR ALL

SUMMARY

The renewable heating support schemes in the EU are very different, both in the level of support and in the availability. Some schemes have a short lifetime and quite limited budgets. Others consist of a soft loan in a period where interest rates are so low that this makes no difference.

The existing diversity of schemes creates huge differences from country to country for the considered standard household that wants to switch to renewable heating. Adding to that, the complex taxation on heating fuels does not always make it easy for consumers to understand when the switch is leading to a saving on heating bills.

The purpose of this fact sheet is to summarise our Report on the economic affordability of a switch from fossil heating to renewable, zero-emissions heating for a family of four that optsfor the cheapest and most suitable technologies available today and aiming at paying back with their savings on bills.
The payback time, defined as the time needed to pay back the upfront cost through the savings on bills, is of key importance for most users: the most relevant finding of the analysis is that at current costs, only 8 countries have an acceptable pay-back time, meaning 8 years or less. If a CO2-tax of €100/ton CO2 were introduced in the EU (either with the Proposed dedicated ETS scheme or alternatively through the Energy Taxation Directive) the number of countries with such acceptable pay-back time would rise to 12 and the overall amount of extra-incentives would be greatly reduced.

The simplest way of increasing affordability is to increase subsidies meant to overcome the upfront cost: our rough estimation for the EU countries indicates that increasing subsidies to a level where all EU households could afford to switch to renewable heating with a payback of 8 years or shorter, amounts to 70 billion €. If a carbon tax of €100/ton CO2e is introduced, the extra subsidy needed will fall to around €20 billion, which could be covered entirely by the revenues. These revenues should also help to compensate for the extra costs borne by vulnerable consumers.

This mapping analysis (which follows two similar ones carried out in the last year) shows that all EU governments but seven still pay millions of euros in subsidies to have new gas boilers installed in our homes, despite evidence that this is slowing down the uptake of renewable heat and undermining Europe's 2030 climate goals.

Moreover, in several countries, the lower taxation that gas enjoys on average compared to the taxation imposed on electricity represents a further obstacle for the uptake of renewable heating.
On a positive note, most countries support in one way or another the installation of renewable energy for heating in the form of heat pumps and solar heating. These subsidies make the shift to renewables more affordable, but to very different degrees. And in all countries but Italy, they are still not enough to make renewable technologies cheaper than fossil technologies.

Indeed, the affordability of heat pumps and solar heating, the technologies considered in this analysis, varies greatly. We can measure this by comparing the net investment (cost minus subsidy) with the average monthly income: this shows large differences from 0 monthly salary required to purchase the technology in Italy (the subsidy pays in full for the installation) or 1 month salary in Austria to 17 monthly salaries in Bulgaria.

In general, this ratio is the least favourable in Eastern EU countries, where salaries tend to be lower: all countries where the investment is above 6 monthly salaries are CEE. For comparison, the investment for a new condensing gas boiler is ranging from less than 1 month salary in Austria and Belgium to 7 monthly salaries in Bulgaria.

Another relevant aspect for the affordability of the investment is the energy price. These also vary among the EU countries and the UK, with gas ranging from €0.03 to €0.11/kWh and electricity prices ranging from €0.09 to €0.25/kWh. To make a heat pump more economically attractive than gas (or oil in countries where this is the standard heating fossil fuel), the electricity must not be more than 3,5 times more expensive. This ratio is exceeded in 5 countries, while in two more the ratio is very close to 3.5.

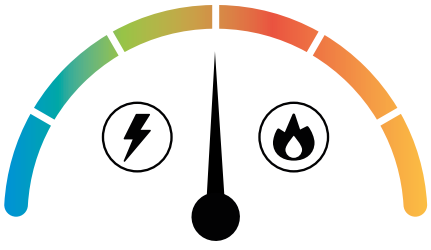
The analysis of the climate emissions related to the different heating technologies in this report indicates that already today in all member states ground-source heat pumps working on grid electricity emit considerably less GHG than gas boilers. It is also the case for all other HP types in all considered countries but two. The uptake of natural and low-GWP refrigerants in HP and renewables in the electricity mix is expected to further improve the climate performance of all heat pumps in the next few years. The report serves as the basis for the maps provided in the website coolproducts.eu where figures are combined with climate emissions related to the different technologies, and incentives schemes' performances are evaluated.

The situation in each country regarding subsidies and overall results is described in the countries' fact sheets in the report.

The model

4 people family, 1 earner, earning the average salary according to Eurostat

Living in a 110 squared meters home

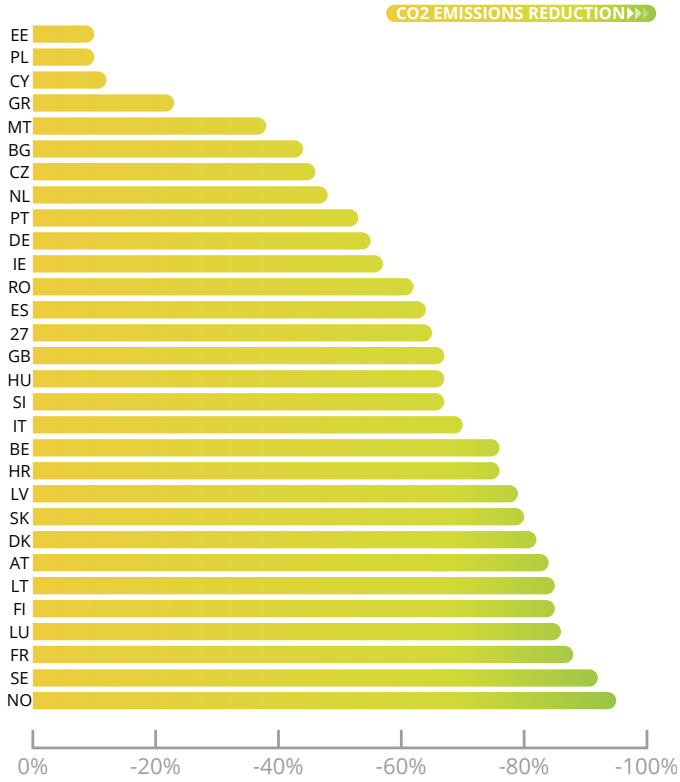


Seasonal consumption or cost of energy vary in each country and are standardised as per Eurostat

IN ALL COUNTRIES GROUND-SOURCE HEAT PUMPS HAVE LOWER EMISSIONS THAN GAS BOILERS

Already today, ground source heat pumps working on the national electricity mix are the least emitting technologies in all member states. This type of technology decreases the CO2 intensity of heating to a degree largely dependent on the carbon intensity of the national electricity grid and the average temperatures in the member states. Heat Pumps, which can be combined with both solar thermal and PV panels for improved results, decrease emissions by an average of 65% compared with installing a new gas boiler. It is worth stressing that some HPs in the market can use existing radiators and do not require special plumbing works.

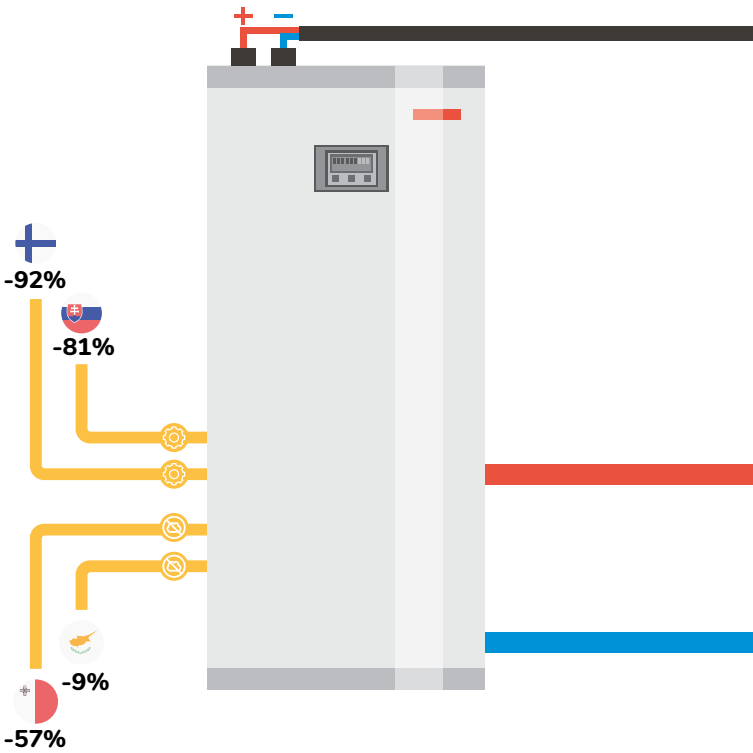
The countries where this technology outperforms gas the most are Sweden, with emissions cut by 92% and France (-88%) while the countries where the gap is smaller are Poland (-10%) and Estonia (-10%), due to their high share of coal in the electricity production.



AIR TO WATER HEAT PUMPS HAVE LOWER EMISSIONS THAN GAS BOILERS IN ALMOST ALL MEMBER STATES

The reference technology for this study, air-to-water heat pumps, are available in all member states and their sales are growing by the year. They outperform gas boilers on emissions in all member states but two, Poland and Estonia, due to the high share of coal in the power sectors of these two states. With the share of renewables due to drastically increase in those two member states by 2030, the performance of HP in these areas is expected to align with the rest of Europe in the second half of the decade, hence offsetting the higher emissions in the second part of its lifespan.

Member states where this technology outperforms gas the most are Sweden with emissions cut by 92%, France 87%, Lithuania 82%, Austria 81%, and Finland 81% while remarkable emissions cuts are achievable also in countries with relatively low shares of renewables in the electricity mix like Cyprus (-38%) or Malta (-57%) where comparison is made with the most common fossil alternative, condensing oil boilers.



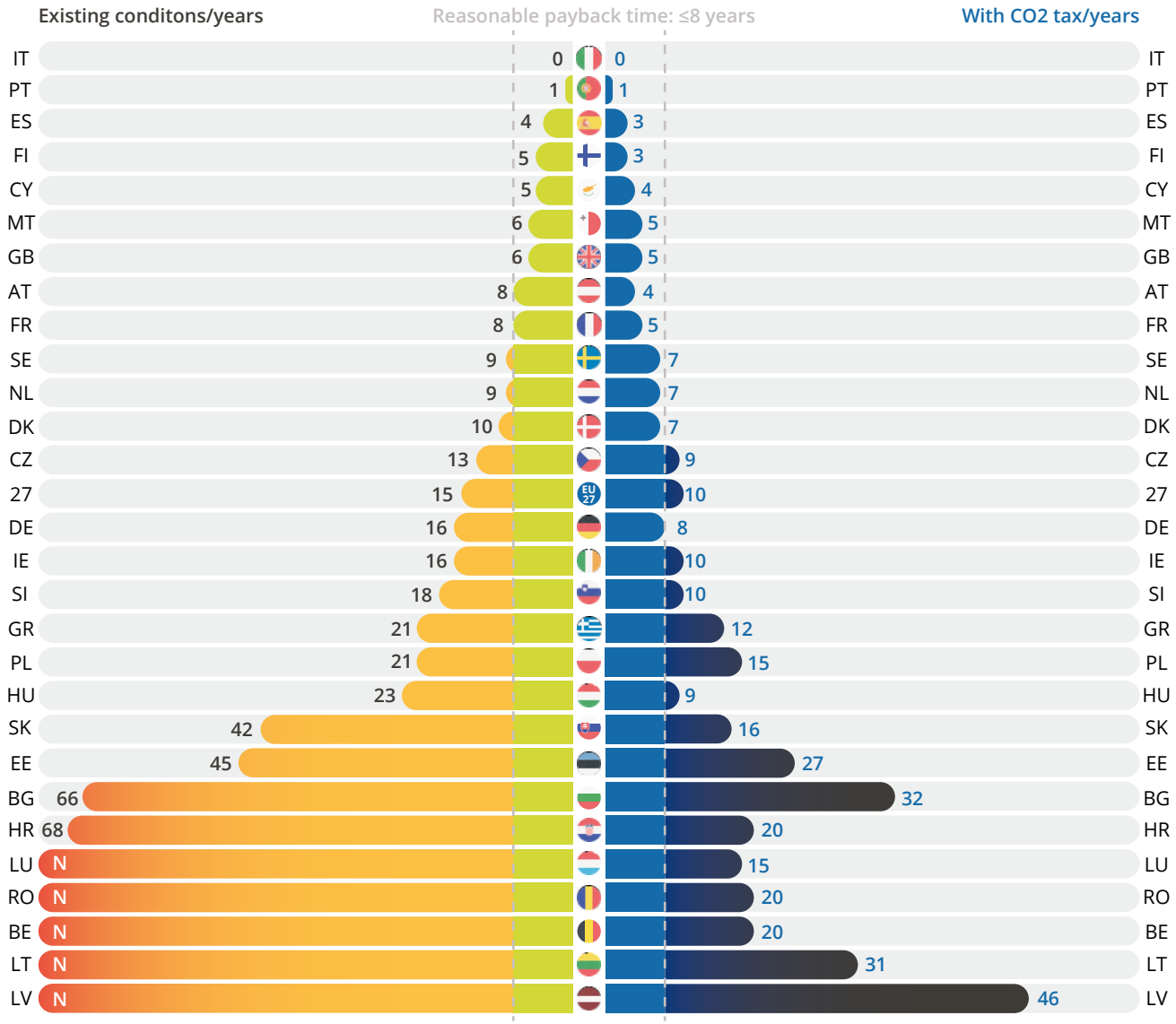
IN 8 MEMBER STATES THE PAYBACK TIME FOR HEAT PUMP WITH EXISTING INCENTIVES AND TARIFFS IS ALREADY ACCEPTABLE

Eight years can be considered an acceptable payback time for a technology that lasts up to 20 years. To pay back the cheapest and most suitable technology to decarbonise heating and cooling in the different member states with savings on bills two conditions must be met: the upfront cost must be brought in line with the average salary if need be, and the running costs must be lower than the fossil alternative's ones.

The subsidy schemes in place are very different from one another, and their help in making the upfront cost bearable varies a lot from country to country. Taxation on fuels is also quite different throughout the EU but on average gas enjoys much lower taxation than electricity, thus making life harder for those who want to switch to renewable, non-emitting heating with a decent payback time. Belgium and Germany are two clear examples of this tariffs setting.

For these reasons, only in 8 member states a switch to renewable heating can be paid back in 8 years or less with the existing incentives and tariffs: in Italy, the overly generous incentive covers the full cost of installation of any heating technology, hence there is no payback time. In Portugal (1y), Cyprus (4y), Spain (4) and Malta (5y), the relatively low demand for heating and the use of solar thermal strike the deal. Finland (5y), France (8y) and Austria (8y) seem to have a good combination of subsidies and tariffs.

Outside the EU, the UK also falls in the list (6y) while Norway has a ban on fossil fuels and the switch can only happen towards renewable heating.



SHOULD A CO2 TAX OF 100€ BE INTRODUCED THESE MEMBER STATES WOULD GROW TO 12 (+UK)

A recent proposal of the European Commission to extend ETS to heating has sparked debate both at European and national levels. Critics say that the proposal would raise the cost of fossil heating and several concerns were raised about the likely increase of energy poverty. Regardless of the tool, the internalisation of both environmental and climate costs must be taken forward while avoiding that this weighs on low-income households and impoverished customers.

Therefore, we applied a scenario of a carbon tax of €100/TCO2e – all other conditions left unchanged- to heating fossil fuels (for electricity we added €70 to the existing €30/T of EU-ETS in Dec 2020) and studied what impact it would have on our model. Indeed, the analysis shows that on average the payback time of the switch from fossil heating to renewable heating would be 1 year shorter in most countries but only 4 more countries MS would join the list of those with a payback of 8 years or less. These are the Netherlands (7y), Denmark (8y), Germany (8y) and Sweden (7y).

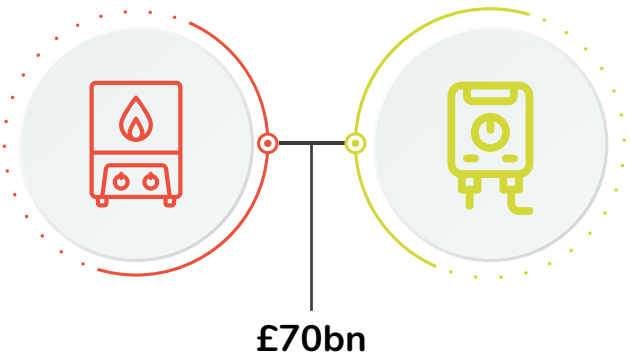
While the carbon pricing alone would not be enough to make heat pumps competitive, it would still halve payback time in countries such as Hungary and Greece, among others.

THE ROUGH AMOUNT TO SHIFT ALL EU'S GAS BOILERS TO RENEWABLE HEATING IS 70BN

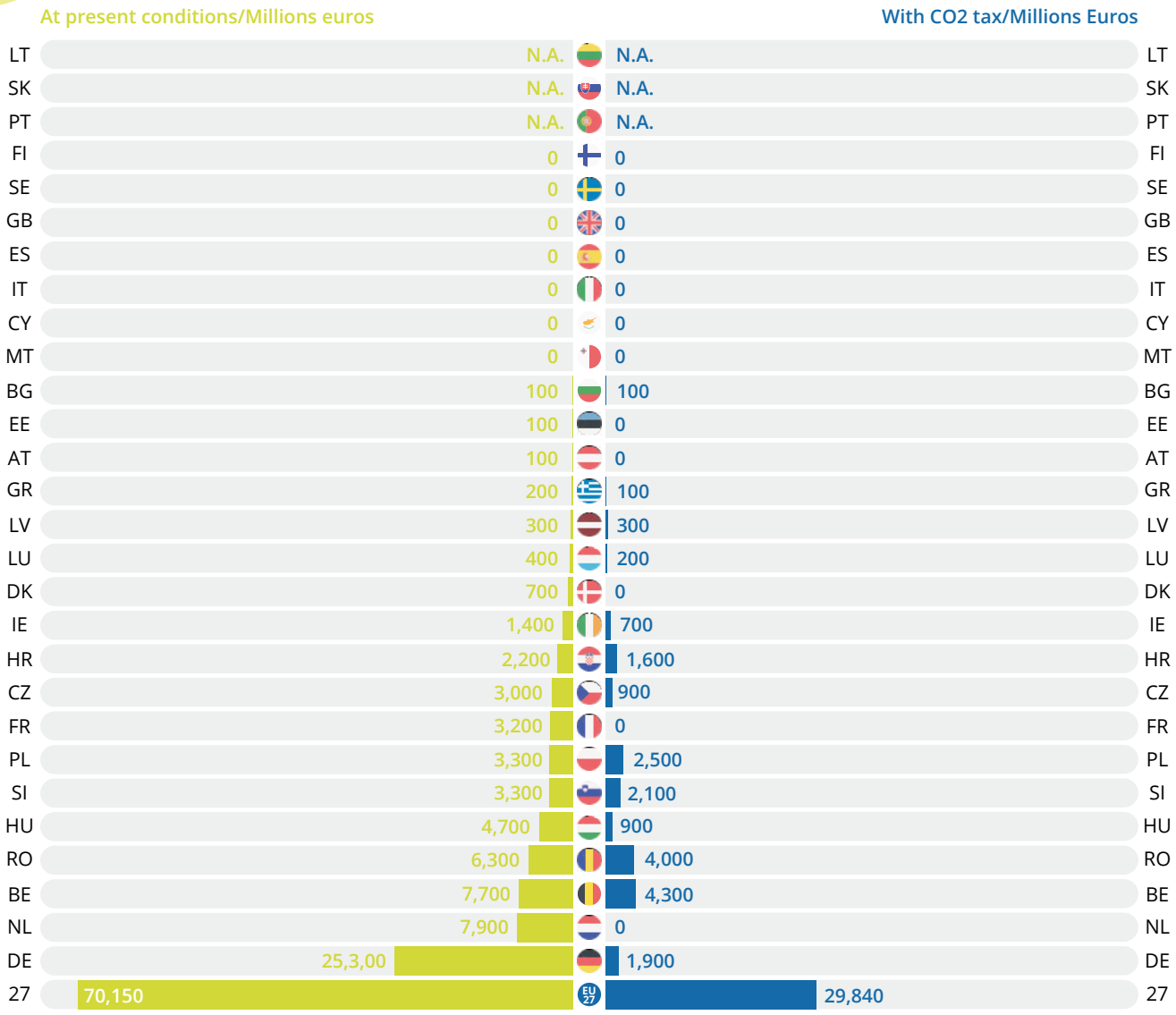
The analysis considers a standardised investment of €10000, and indicates that in most countries there is a need for additional subsidies for the considered standard household to be able to pay back such sum in less than 8 years through the savings on heating bills.

In countries with high electricity costs, the needed extra incentive is the highest. Countries with low existing incentives and low average income are in the need of an extra boost too. EEC countries where lower wages and very low to non-existing subsidy schemes are the ones where households are in dire need of help: Bulgarian households, for instance, would need 8900 Euro each, for a national cost of roughly 100M while in Romania the individual amount would be lower but given the size of the market, the national effort would be more relevant (6.3Bn).

The countries where investments would be the least are Sweden (10M) and Austria (50M) while the highest sums are those needed for Germany (25.3Bn), Netherlands (7.9Bn) and Belgium (7.7Bn)



Total investment per country



53,457,000 **Number of fossil boilers**

THE OVERALL COST WOULD GO DOWN TO 20BN IF A CO2 TAX OF €100 WAS IN PLACE.

The introduction of a carbon pricing system would increase savings on bills for those switching to renewable heating, especially if working on some low-taxation dedicated heat pump tariff or combined with local solar thermal or PV production.

This would in turn substantially decrease the amount of extra funds needed to overcome the installation costs hurdle, bringing it to as low as 20Bn.

In many countries, the need for extra funds would disappear (France, Denmark and Netherlands, among others) while in most countries the difference would be less evident and in Bulgaria there would be no difference in the funds needed.

Remarkably, in a scenario of a total replacement of the gas boilers stock in 15 years, the yearly investment to cover the existing subsidy gap would be as low as 1.3Bn.

This sum would be fully compatible with the allocation of the proposed Climate Social Fund, part of the Fit For 55 package, whose objective include investments for the decarbonisation of heating and cooling of buildings.

SOUTHERN COUNTRIES HAVE THE SHORTEST PAYBACK TIME THANKS TO SOLAR THERMAL

In Cyprus, Malta, Portugal and Spain, a large part of the country can get by with a limited amount of winter heating: typically, the heating is needed in January and February and occasionally on cold days in spring or fall. Conversely, the importance of year-long demand for sanitary hot water on the overall consumption is higher. For this reason, households would be better off with an air-to-air heat pump combined with solar thermal: the former can provide heat in winter and cooling in summer, the latter can provide virtually 100% of the needed hot water. This technology mix is less expensive than an air-to-water or a ground-source heat pump and allows for quicker payback time while delivering consistent CO2 savings at the same time.

While those living in the mountainous areas of these countries might need to turn to other heat pumps, the considered standard families in these countries can enjoy a 4 years payback, which becomes 3 when considering CO2 pricing.

In many countries, the need for extra funds would disappear (France, Denmark and Netherlands, among others) while in most countries the difference would be less evident and in Bulgaria there would be no difference in the funds needed.

POLICY SUGGESTIONS

Do not focus on tariffs and costs only

Not everybody can bank on future savings, and the problem of upfront cost is a serious one. A policy that aims at enabling change via the compensation of the carbon pricing might protect from the impact of such a measure, but might not just be useful to enact change.

Carbon pricing itself proves to be an insufficient measure when it comes to improving the economics for renewable heating unless coupled with subsidies that rebate the investment costs.

Besides the net cost of the installation (after applying subsidies), even when the payback time is very short can still be a problem for families that cannot count on savings.

Upfront anticipation of tax deductions, as applied in Italy, seems to be working well, among other things because it applies to consumers of the no-tax area too. Other options would be grants or E.S.Co schemes that would pay back through savings. Electricity utilities could play a major role by selling energy-efficient and renewable heating technologies.

A regulatory framework that favours renewable heating should also be in place: Minimum Energy Performance standards should be driving this change, in a context where permitting is made easier through revised urban building codes.

Apply revenues from ETS and Recovery and Resilience funds

The combined effect of the national allocation of the recovery and resilience plans and a European fund based on the revenues from carbon pricing could become a key enabler of both national and local projects aiming at proven technologies and certified CO2 savings.

If we consider that the average heating system has a lifespan of 20 years, roughly 5% of the installed stock will be replaced every year. Given the increased refurbishment ratio expected in the coming years and the increased cost of gas, a more realistic figure would be 7%.

The analysis estimated roughly 70Bn the cost of switching EU's gas boilers to renewable heating. This would result in a yearly cost of ca. 4.7Bn over a 15 years period.

This figure includes neither oil and biomass stoves/ boilers nor district heating, which would need to be addressed with extra funding. Shift from oil heating requires substantial less subsidies given the higher cost of oil and the lower number of oil heated houses.

Target easier buildings and low-income households first

Almost all buildings are compatible with the existing renewable heating technologies considered in the report. Nevertheless, not all buildings will be refurbished at once.

Besides the older boilers that come to the end of their life, replacements should focus on buildings where the switch pays back quicker and the existing technologies are perfectly suitable to replace fossil with minimal costs.

A special attention should be given to those consumers mostly in need of bills cuts and to standardised, large-scale interventions in the social housing domain.

These technologies are quickly evolving: for instance, several heat pumps recently placed on the market are based on low-GWP and natural refrigerants and can offer high flow temperature and replace fossil boilers as plug-in solutions.

The evolution of the technologies will not only bring down costs but also allow for more sophisticated solutions that can apply to those situations where today heat pumps and solar thermal are not the optimal solutions.

Some buildings, as blocks of flats with individual heating and historical buildings, might need special subsides to switch to district heating or use an interim solution such hybrid boilers.

BELGIUM

Payback time (years)	Never
	€4,760
	€7.7Bn
	1,615,000

BULGARIA

Payback time (years)	66
	€8,888
	€100m
	11,000

CZECHIA

Payback time (years)	13
	€3,068
	€3.3Bn
	982,000

DENMARK

Payback time (years)	10
	€2,144
	€700m
	388,000

GERMANY

Payback time (years)	16
	€2,312
	€25.3Bn
	10,933,000

ESTONIA

Payback time (years)	45
	€8,344
	€50m
	6,000

IRELAND

Payback time (years)	16
	€3,570
	€1.4Bn
	395,000

GREECE

Payback time (years)	21
	€2,564
	€200m
	76,000

SPAIN

Payback time (years)	4
	-
	€0
	4,641,000

FRANCE

Payback time (years)	8
	€320
	€3.2Bn
	10,062,000

CROATIA

Payback time (years)	68
	€8,914
	€2.2Bn
	270,000

ITALY

Payback time (years)	0
	-
	€0
	13,419,000

CYPRUS

Payback time (years)	5
	-
	€0
	132,000

LATVIA

Payback time (years)	Never
	€10,000
	€300m
	30,000

LITHUANIA

Payback time (years)	Never
	€10,000
	n.a.
	n.a.

LUXEMBOURG

Payback time (years)	Never
	€6,500
	€400m
	64,000

HUNGARY

Payback time (years) 23

€3,405

€4.7Bn

1,388,000

MALTA

Payback time (years) 6

-

€0

69,000

NETHERLANDS

Payback time (years) 9

€1,429

€7.9Bn

5,498,000

AUSTRIA

Payback time (years) 8

€125

€90m

719,000

POLAND

Payback time (years) 21

€4,593

€3.3Bn

727,000

PORTUGAL

Payback time (years) 1

-

n.a.

n.a.

ROMANIA

Payback time (years) Never

€5,000

€6.3Bn

1,261,000

SLOVENIA

Payback time (years) 18

€4,078

n.a.

n.a.

SLOVAKIA

Payback time (years) 42

€5,986

€3.3Bn

558,000

FINLAND

Payback time (years) 9

-

€0

203,000

SWEDEN

Payback time (years) 5

€1,219

€10m

10,000

UNITED KINGDOM

Payback time (years) 6

-

€0

22,879,000