

# Clean heat standards: New tools for the fossil heat phaseout in Europe

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## Executive summary

This paper explores how new policy tools called ‘clean heat standards’ could reinforce the EU framework for heat decarbonisation and facilitate the implementation of an end date for the sale of fossil fuel boilers.

Two-thirds of the energy the EU uses to heat buildings comes from fossil fuels. Even before the Russian invasion of Ukraine and the resulting energy crisis, the European Commission had earmarked heating as the energy end-use that needs to decarbonise most quickly to meet climate targets. This requires upgrades in building performance and heating system replacements, as well as investment in heat networks and in the wider energy infrastructure.

EU legislators recently agreed to cap greenhouse gas (GHG) emissions from heating and transport fuels under a new emissions trading system. A new Social Climate Fund will provide financial support for Member States to help households during the energy transition. Some countries, such as Germany and the Netherlands, have set out dates by which standalone fossil fuel boilers would no longer be sold. The Commission has also announced that it will propose a revision of ecodesign rules for heating appliances, meaning a de facto ban on the sale of standalone fossil fuel boilers by 2029.

This ecodesign revision can significantly advance heating decarbonisation and ensure that fossil fuel boilers progressively disappear from our homes. A rapid, effective and fair decarbonisation of heating will nevertheless need additional policy action. Indeed, the supply chain must ramp up today to meet the EU goal of deploying 30 million additional heat pumps by 2030. It is unclear whether the carbon price signal from the new emissions trading system will lead to such a rapid expansion, as the first GHG reductions could take place in different sectors or stem from end-users rationing their energy use. Even when fossil fuel boilers are no longer on the market, reaching our

climate goals might require the removal of existing boilers from homes before the end of their lifetimes. Another challenge is to ensure a fair transition, wherein low-income households are also able to switch heating systems and are first in line to benefit from the energy transition.

This paper explores how novel policy tools called ‘clean heat standards’ could reinforce the EU framework for heat decarbonisation and support the implementation of an end date for the sale of fossil fuel boilers. Clean heat standards place a quantitative target on market actors to decarbonise heating and provide some flexibility in how to achieve it. In the United States, the state of Colorado has imposed a clean heat standard on pipeline gas utilities; and other states, including Vermont, Massachusetts and Maryland, are developing clean heat requirements on both pipeline and non-pipeline energy companies to achieve GHG reductions in the heating sector. Those U.S. standards are intended to reward both actions promoting renewable heat consumption, such as heat pump installations, and actions reducing energy demand, such as building renovations. In the United Kingdom, a different approach has been suggested in a public consultation by the government. Inspired by the EU’s new vehicle CO<sub>2</sub> targets, this regulation would obligate heating system manufacturers to deliver a rising proportion of heat pumps in their annual sales.

RAP<sup>1</sup> urges the European Commission and national governments in the EU to consider regulations to accelerate the replacement of fossil fuel-based heating systems with low-carbon alternatives, including clean heat standards. Designed well, clean heat standards would provide policymakers with a way of ensuring that end users can participate in the energy transition, while giving the clean heating supply chain the policy predictability needed to encourage private-sector investment. If they opt to set such a policy, the following recommendations can help decision-makers meet overarching goals such as putting the heating sector in line with climate ambitions, reducing the exposure of households and companies to increases in energy prices, and improving access to clean heating for all.

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#### Recommendations for designing a clean heat standard



Set a trajectory for heat decarbonisation, facilitating an end date for the sale of fossil fuel boilers.



Support the just energy transition.



Create synergies with a suite of clean heat policies.



Ensure that the clean heat solutions promoted by the policy do not create lock-ins.



Build on existing policies, including energy efficiency obligations, if relevant in the national context.

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# Introduction

The energy crisis highlighted the fact that the EU still predominantly heats buildings with fossil fuels.<sup>2</sup> The decarbonisation of the heating sector is essential to build the EU's resilience to gas market shocks and to fight climate change.

Governments around the world are rolling out various policy instruments to accelerate heat decarbonisation. Among these policies, 'clean heat standards' give a target for heating sector market actors to increase the uptake of clean heat products and services. Clean heat standards can include different tools:

- In Colorado, Vermont, Massachusetts and other U.S. states, legislators have adopted or are considering the adoption of an obligation on heating fuel suppliers to provide rising levels of clean heat services. These clean heat standards allow energy companies to reach their obligation through multiple pathways: electrification through heat pumps, biogas blending, biomass boilers, and demand reduction through fabric efficiency improvements.
- In Europe, two Member States (France and Ireland) have adopted or are considering an obligation on heating fuel suppliers to increase the share of renewable energy in fuels provided to customers.
- The UK government is developing an obligation for heating appliance manufacturers to sell an increasing share of heat pumps as compared to fossil fuel boilers.

Clean heat standards can apply to market actors such as energy network companies, energy suppliers and manufacturers of heating equipment. In theory, end users are also market actors, but in practice it is easier to impact their behaviour through appliance standards, bans on fossil fuel equipment, or building codes. These tools can complement each other: appliance standards and bans directly exclude certain technologies from the market, while clean heat standards provide a positive target for market actors to meet.

Quantitative obligations are common in environmental policies. They aim to achieve a reduction of polluting substances or to increase the use of renewable resources by imposing a cap or setting an objective for stakeholders to meet. The obligated parties have some flexibility in how they reach their obligations. Similar policy instruments in the energy efficiency field, like energy efficiency obligation schemes, are called market-based mechanisms, highlighting that market actors play an active role by choosing the best routes for compliance. Obligated parties can, for example, decide to conduct the activities themselves or hire a third party. In some schemes they can buy credits from other obligated parties who overachieve their target.

The target set by a clean heat standard could be expressed in various ways. These include the number of installations or sales (such as installation of heat pumps, or weatherisation of a certain number of housing units or square feet of building space),

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<sup>2</sup> Nijs W., Tarvydas D., Toileikyte A. (2021). *EU challenges of reducing fossil fuel use in buildings – The role of building insulation and low-carbon heating systems in 2030 and 2050*. Report for the European Commission DG Energy. <https://publications.jrc.ec.europa.eu/repository/handle/JRC127122>

the amount of GHG reductions achieved or local air pollutants removed, the amount of renewable heat supplied, and so on.

The provision of clean heat services can derive from upstream interventions, such as replacing fossil fuels with renewable fuels, or downstream interventions, including the replacement of heating appliances and actions lowering heat demand – or from a combination of the two. The possibility for obligated parties to deploy these different solutions to fulfil their obligation depends on the policy design of the clean heat standard in question: typical elements are summarised in Figure 1.

**Figure 1. Elements of a clean heat standard**



The EU wants to accelerate the decarbonisation of heating. In this paper, we explore the potential role of clean heat standards in achieving that goal. We describe the challenge of heat decarbonisation and take stock of the policy framework related to clean heat in the EU. We outline the role that clean heat standards could play in this context. We explore several design options for clean heat standards, and provide recommendations and advice for decision-makers and energy transition advocates in the EU.

## The case for clean heat standards in the EU

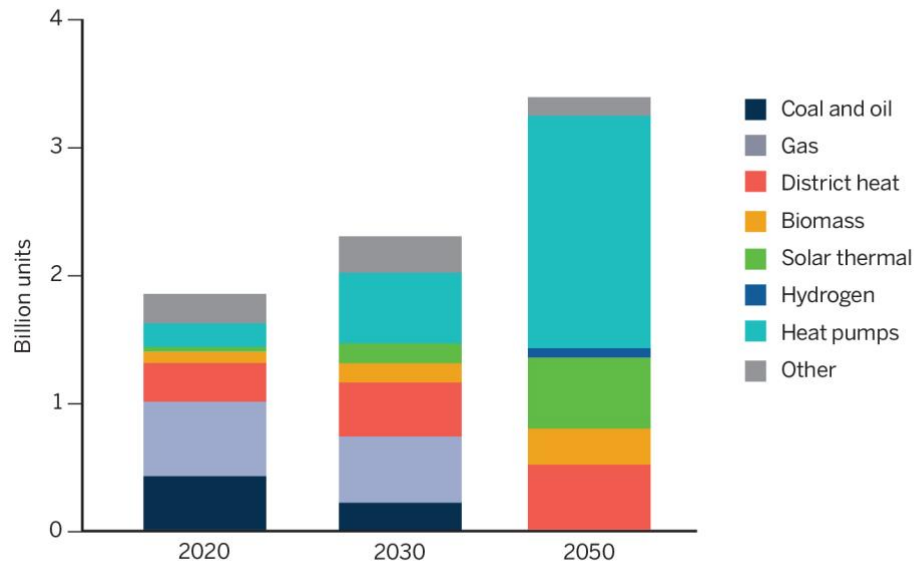
### The challenge of heat decarbonisation

Decarbonising EU heating requires a mix of interventions in buildings, heat networks and wider infrastructure. Investments in the energy performance of buildings, such as fabric insulation, reduce heating needs. Changes in behaviours or lifestyles also lower these needs, for example when people decrease indoor temperatures. Further investments can ensure that clean energy sources cover the remaining needs for heating, with electricity playing a crucial role.<sup>3</sup> Increasing a building's ability to operate flexibly can also ensure that it consumes electricity at times when decarbonised sources

<sup>3</sup> See for example D'Aprile, P., Engel, H., van Gendt, G., Helmcke, S., Hieronimus, S., Nauc ler, T., Pinner, D., Walter, D., & Witteveen, M. (2022). *Net-Zero Europe. Decarbonization pathways and socioeconomic implications*. McKinsey. <https://www.mckinsey.com/capabilities/sustainability/our-insights/how-the-european-union-could-achieve-net-zero-emissions-at-net-zero-cost>

supply this electricity.<sup>4</sup> Installing electric heat pumps can achieve both energy use reduction and the decarbonisation of energy sources. Indeed, they are around four times more efficient than boilers and can be powered by renewable electricity. All major decarbonisation assessments foresee a major role for heat pumps,<sup>5</sup> as Figure 2 illustrates.<sup>6</sup>

Figure 2. Global heating equipment stock in the International Energy Agency's global net-zero trajectory scenarios



Source: International Energy Agency. (2021). *Net-zero by 2050: A roadmap for the global energy sector*.

In 2017, roughly 83% of the installed capacity of space heating in the EU – some 129 million boilers – was fossil-fuel fired.<sup>7</sup> Recent sales of condensing boilers have typically been three to four times greater than heat pump sales, as Figure 3 shows.<sup>8</sup> In Germany alone, 700,000 oil and gas boilers were installed in 2021 compared to 154,000 heat pumps.<sup>9</sup> Currently, about 10,000 heat networks supply heat to 60 million EU citizens,<sup>10</sup> and two-thirds of this district heat is generated with fossil fuels.<sup>11</sup> But the market is

<sup>4</sup> Yule-Bennett, S., & Sunderland, L. (2022). *The joy of flex: Embracing household demand-side flexibility as a power system resource for Europe*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/joy-flex-embracing-household-demand-side-flexibility-power-system-resource-europe>

<sup>5</sup> Lowes, R., Rosenow, J., Scott, D., Sunderland, L., Thomas, S., Graf, A., Baton, M., Pantano, S., & Graham, P. (2022). *The perfect fit: Shaping the Fit for 55 package to drive a climate-compatible heat pump market*. Regulatory Assistance Project, Agora Energiewende, CLASP, Global Buildings Performance Network. <https://www.raonline.org/knowledge-center/the-perfect-fit-shaping-the-fit-for-55-package-to-drive-a-climate-compatible-heat-pump-market>

<sup>6</sup> International Energy Agency. (2021). *Net Zero by 2050: A Roadmap for the Global Energy Sector*. <https://www.iea.org/reports/net-zero-by-2050>

<sup>7</sup> Zill, M., Boye Olesen, G., & Toulouse, E. (2020). *Five Years Left: How ecodesign and energy labelling can decarbonise heating*. ECOS. <https://ecostandard.org/wp-content/uploads/2020/12/Five-Years-Left-How-ecodesign-and-energy-labelling-Coolproducts-report.pdf>

<sup>8</sup> Data for condensing oil and gas boilers from Association of the European Heating Industry. (2022). *Heating Market Report 2021*. <https://ehi.eu/wp-content/uploads/2022/09/EHI-2021-Heating-Market-Report.pdf>. Data for heat pumps from "Market data", European Heat Pump Association (EHPA), accessed 1 November 2022, <https://www.ehpa.org/market-data/>. 2021 data for condensing oil and gas boilers was not available at the time we wrote this report.

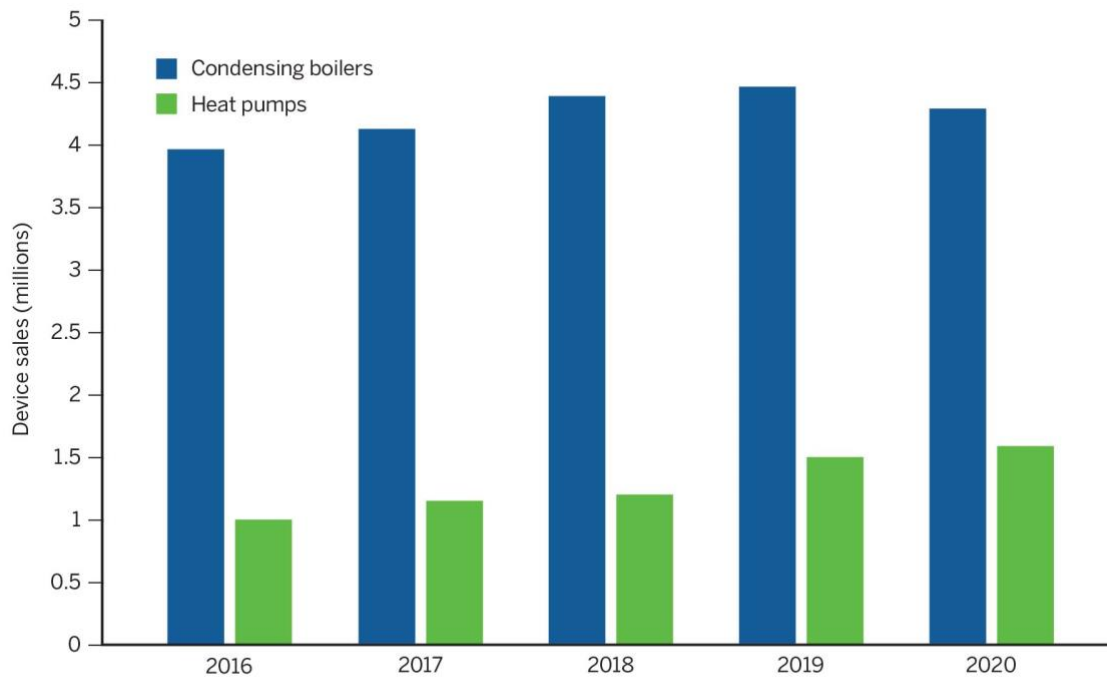
<sup>9</sup> Gibb, D., & Jahn, A. (2022). *"Game on" for Germany's heat pump transformation*. Regulatory Assistance Project. <https://www.raonline.org/blog/game-on-germany-heat-pump-transformation>

<sup>10</sup> Euroheat & Power. (2022). *DHC market outlook*. <https://www.euroheat.org/policy/dhc-market-outlook.html>

<sup>11</sup> 2018 data in Bacquet, A., Galindo Fernández, M., Oger, A., Themessl, N., Fallahnejad, M., Kranzl, L., Popovski, E., Steinbach, J.,

moving. Sales of heat pumps surged in 2021 in Europe, surpassing 2 million units sold for the first time and comprising roughly 34% of market growth.<sup>12</sup>

Figure 3. Sales of heating devices in Europe



Source: Association of the European heating industry. (2022). *Heating market report 2021* and European Heat Pump Association. (2022). *Market data*.

Reaching a 55% 2030 climate target will require the replacement of the heating system in close to one in four of all EU buildings during the last five years of this decade.<sup>13</sup> The Commission assessed that 30 million additional hydronic heat pumps should be installed in the EU by 2030. Following Russia's invasion of Ukraine, the Commission proposed doubling the heat pump deployment rate in the coming years to frontload these installations.<sup>14</sup> By 2030, the market for building renovations could double and the market for heating systems renovations could triple.<sup>15</sup>

Further investments need to be made in district heating networks,<sup>16</sup> to grow new networks and clean up existing ones. Studies differ on the potential of district heating,

Bürger, V., Köhler, B., Braungardt, S., Billerbeck, A., Breitschopf, B., & Winkler, J. (2022). *District heating and cooling in the European Union: overview of markets and regulatory frameworks under the revised Renewable Energy Directive*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2833/962525>

<sup>12</sup> European Heat Pump Association, 2022.

<sup>13</sup> Thomas, S., Sunderland, L., & Santini, M. (2021). *Pricing is just the icing: The role of carbon pricing in a comprehensive policy framework to decarbonise the EU buildings sector*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/pricing-just-icing-role-carbon-pricing-comprehensive-policy-framework-decarbonise-eu-buildings-sector>

<sup>14</sup> European Commission. (2022). *REPowerEU: Joint European Action for more affordable, secure and sustainable energy*. COM/2022/108 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN>; European Commission. (2022). *REPowerEU Plan*. COM/2022/230 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022DC0230>

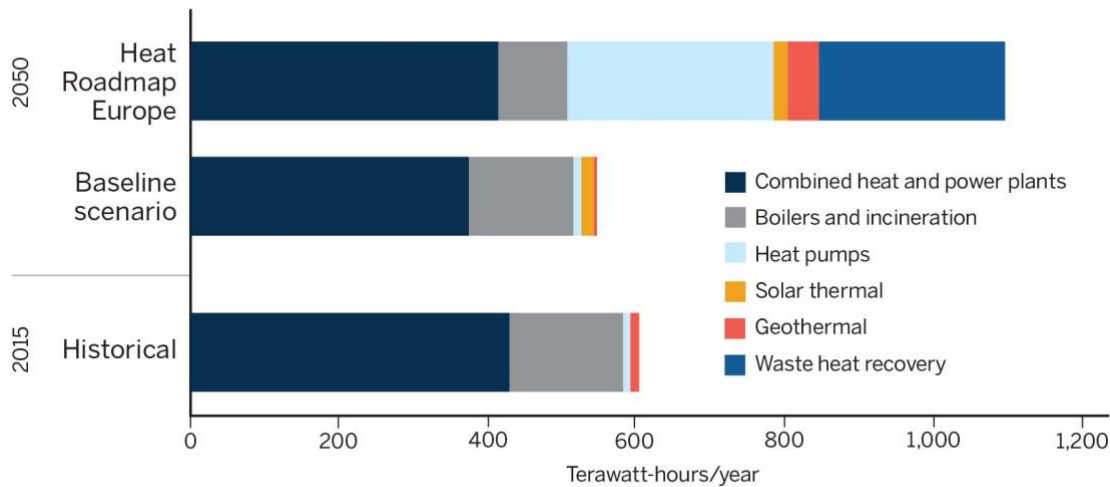
<sup>15</sup> Nijs et al., 2021.

<sup>16</sup> International Energy Agency. (2022). *District Heating*. <https://www.iea.org/reports/district-heating>



but more ambitious scenarios like the Heat Roadmap project that it could cover up to 50% of heat demand by 2050 (see Figure 4).<sup>17</sup>

Figure 4. Heat production for district heating in Europe in historical, baseline and Heat Roadmap scenarios



Source: Paardekooper, S. et al. (2018). *Heat Roadmap Europe*.

Identifying the barriers to investments in clean heating is important in designing effective policies. Households face economic barriers such as the high upfront costs for first-time heat pump installations, and non-economic barriers such as a lack of consumer information, constraints on supply chains, and, where homes are rented, split incentives between landlord and tenant.<sup>18</sup> A lack of planning and coordination of public and private actors can prevent investments in heat networks. Uncertainty regarding the future status of incumbent infrastructure, including the gas network, can also alter the investment climate for clean heat solutions.<sup>19</sup> Many of these barriers are higher for low-income households, who are also disproportionately affected by current increases in energy prices.<sup>20</sup> The EU framework only partially addresses these barriers.

## The limits of the EU policy framework

The EU and its Member States address heat decarbonisation through climate and energy policies in the context of the EU Green Deal, which pledges to leave no person or place behind.<sup>21</sup> The framework is illustrated in Figure 5 and further outlined in Annex 1.

<sup>17</sup> Data from Heat Roadmap Europe 4 (HRE4), a project funded by the European Union's Horizon 2020 research and innovation programme to develop low-carbon heating and cooling strategies. Paardekooper, S., Lund, R. S., Mathiesen, B. V., Chang, M., Petersen, U. R., Grundahl, L., David, A., Dahlbæk, J., Kapetanakis, I. A., Lund, H., Bertelsen, N., Hansen, K., Drysdale, D. W., & Persson, U. (2018). *Heat Roadmap Europe 4: Quantifying the impact of low-carbon heating and cooling roadmaps*. Aalborg Universitetsforlag. <https://heatroadmap.eu/roadmaps>

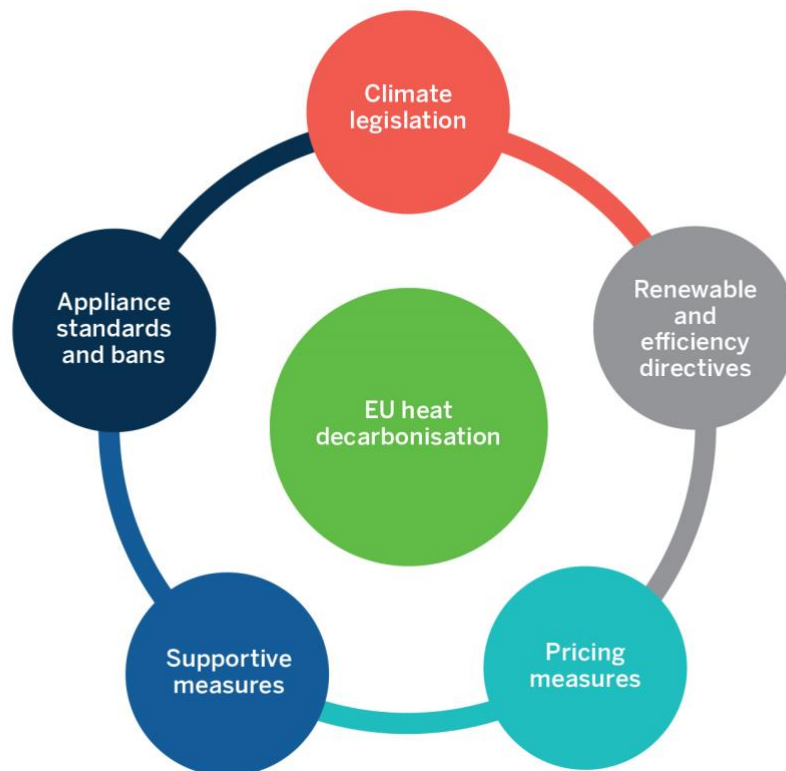
<sup>18</sup> Landlords who do not pay energy bills are not motivated to save money through efficiency investments, and tenants, who may not permanently occupy a home, are not motivated to make the investment in more efficient appliances.

<sup>19</sup> Anderson, M., Rosenow, J., & Cowart, R. (2022). *The clash with gas: Should it stay or should it go?* Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/clash-with-gas-should-it-stay-or-should-it-go>

<sup>20</sup> Sunderland, L., & Gibb, D. (2022). *Taking the bum out of heating for low-income households*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/taking-bum-out-of-heating-low-income-households>

<sup>21</sup> European Commission. (n.d.). *A European Green Deal*. [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)

Figure 5. The EU's heat decarbonisation policy framework



Out of these elements, the main measures to address heat decarbonisation are:

- **The EU emissions trading system including heating fuels (EU ETS 2)**

The EU emissions trading system (EU ETS) puts an emissions cap on several sectors, including electricity-based heating and large district heating plants. In 2022, EU legislators agreed to create a new, separate emissions trading system for fuels supplied to buildings, road transport and certain industrial sectors. This EU ETS 2 will start in 2027. The number of emissions allowances will decrease over time. Revenues from emissions trading will feed into a Social Climate Fund. The Fund will finance national 'social climate plans' aiming to soften the impacts of the new emissions trading system on vulnerable households, micro-enterprises and transport users.<sup>22</sup>

- **The renewable heating and cooling target in the Renewable Energy Directive**

The proposals for a revised Renewable Energy Directive (RED) suggest that Member States increase the share of renewable energy in heating and cooling each year. The methodology favours inefficient technologies such as biomass stoves.<sup>23</sup> EU legislators are discussing this provision.

<sup>22</sup> Council of the EU. (18 December 2022). 'Fit for 55': Council and Parliament reach provisional deal on EU emissions trading system and the Social Climate Fund. [Press release] <https://www.consilium.europa.eu/en/press/press-releases/2022/12/18/fit-for-55-council-and-parliament-reach-provisional-deal-on-eu-emissions-trading-system-and-the-social-climate-fund>



<sup>23</sup> Gibb, D., Thomas, S., & Rosenow, J. (2022). *Metrics matter: Efficient renewable heating and cooling in the Renewable Energy Directive*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/metrics-matter-efficient-renewable-heating-cooling-renewable-energy-directive>



- **Ecodesign standards for heating appliances**

According to the International Energy Agency, to transition to a net-zero energy system by 2050, no new fossil fuel boilers should be being sold by 2025.<sup>24</sup> The European Commission is considering a de facto ban on heating appliances running on fossil fuel through the revision of ecodesign requirements for heating appliances from 2029 onwards.<sup>25</sup> A few Member States, including Germany and the Netherlands, have already adopted appliance standards and bans that set such a backstop date, as described in Table 1 below.<sup>26</sup>

**Table 1. Heating appliance standards in Germany and the Netherlands**

	 '65%-Rule' in Germany	 Hybrid heat pump standard in the Netherlands
<b>Date</b>	From 1 January 2024	From 2026
<b>Scope</b>	All new heating systems, in new and existing buildings	All new heating systems, in new and existing buildings. Some exemptions foreseen, for example if a local heat transition plan includes the rollout of a district heating system
<b>Requirement</b>	All new heating systems must run on a minimum of 65% renewable energy	Not defined yet
<b>Compliant systems</b>	Electric heat pumps, electric heat, <sup>27</sup> district heating, <sup>28</sup> biomass boilers fed with sustainable solid biomass or liquid biofuels, hybrid heating systems, <sup>29</sup> standalone gas boilers with certified sustainable biomethane, renewable hydrogen or "other green gases"	To be defined. The announcement is that all new heating systems must be "more sustainable," which could mean a hybrid heat pump, or alternatives such as a fully electric heat pump or a connection to a heat network

The inclusion of heating fuels in an emissions trading system will put a carbon price on these fuels and ensure GHG cuts in the sectors covered by the scheme. By avoiding new investments in heating appliances running on fossil fuels, the revision of ecodesign rules can significantly advance the energy transition in the heating sector and

<sup>24</sup> International Energy Agency, 2021.

<sup>25</sup> European Commission. (2022). *EU 'Save Energy'*. COM/2022/240 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A240%3AFIN&qid=1653033053936>

<sup>26</sup> Lowes, R. et al., 2022; German Federal Ministries for Economic Affairs and Climate Action (BMWK) & for Housing, Urban Development and Building (BMWSB). (2022). *65 Prozent erneuerbare Energien beim Einbau von neuen Heizungen ab 2024*. [65 percent renewable energies for new heating system installations as of 2024]. [https://www.bmwk.de/Redaktion/DE/Downloads/Energie/65-prozent-erneuerbare-energien-beim-einbau-von-neuen-heizungen-ab-2024.pdf?\\_\\_blob=publicationFile&v=6](https://www.bmwk.de/Redaktion/DE/Downloads/Energie/65-prozent-erneuerbare-energien-beim-einbau-von-neuen-heizungen-ab-2024.pdf?__blob=publicationFile&v=6); Dutch government. (2022). *Vragen en antwoorden: hybride warmtepomp de standaard in 2026*. [Questions and answers: Hybrid heat pump the standard in 2026]. <https://www.rijksoverheid.nl/documenten/publicaties/2022/05/23/qena-hybride-warmtepomp-standaard-in-2026>

<sup>27</sup> Only in well insulated houses with very low heat demand.

<sup>28</sup> The German government assumes that the district heating will be carbon neutral by 2045.

<sup>29</sup> Provided that a maximum of 35% of the useful heat is from fossil fuels. For hybrid heat pumps, it will be assumed 65% renewable (and compliant), as long as the power share of the heat pump is 30% or higher.

encourage a progressive disappearance of these heating systems from our houses. Some issues, however, require further attention:

- **Ramp up of supply chains:** Carbon prices and the renewable heat targets do not provide a clear trajectory for the deployment of clean heating appliances. As ecodesign rules are not adopted yet, there is some uncertainty on the end date for the sale of fossil fuel boilers. Nevertheless, the supply chain for clean heating appliances needs to ramp up today to deploy 30 million additional heat pumps by the end of this decade.
- **Early replacement of existing fossil fuel heating equipment:** The supply chain might still need support when fossil fuel boilers are no longer on the market. Indeed, while the EU intends to decarbonise heating faster than other sectors, fossil fuel boilers with a long lifetime remain on the market today. Therefore, we might need to replace fossil heating boilers with cleaner alternatives before the end of their lifetimes. Some Member States are already considering this issue. In Austria for example, the government presented legislation that would ensure that oil, coal and liquified gas boilers are removed from buildings by 2035 at the latest, following a stepwise approach depending on the age of the boiler.<sup>30</sup>
- **Low-income households:** Although funding is available from the Social Climate Fund, ensuring heating system replacements among low-income households remains a challenge, as is described in the box below. While carbon pricing will have an outsized impact on these households, the current policy framework does not ensure that they will be first in line to benefit from the energy transition.

As part of a comprehensive policy package, clean heat standards can help fill that gap.

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The policy framework at the EU and Member State level is insufficient to deliver a rapid, effective and fair transition to clean heat.

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<sup>30</sup> Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK). (2022). *Erneuerbaren-Wärme-Gesetz im Ministerrat beschlossen* [Renewable Heat Act passed in the Council of Ministers]. [Press release]. [https://www.bmk.gv.at/service/presse/gewessler/20221103\\_ewg.html](https://www.bmk.gv.at/service/presse/gewessler/20221103_ewg.html)

### Taking the ‘burn’ out of heating for low-income households

The energy crisis of 2022 has shown that Europe’s continued reliance on fossil fuels threatens energy security and affordability. Low-income households are highly vulnerable in these situations, as they are the most exposed to this price risk and the least able to absorb the financial shocks of volatile energy prices.

Evidence suggests that the most affordable clean heat solutions available to households over the coming decades will be heat pumps and connection to a low-carbon district heating network. A RAP study shows how low-income households can rid themselves of fossil fuels and switch to clean heating.<sup>31</sup>

In the past, fossil heating was cheap. Prior to the energy crisis, it was often more affordable than cleaner options. Furthermore, especially if a household is underheating its home, the fixed costs of switching to a clean heating solution and fully heating are greater than they initially appear. As fossil gas prices skyrocketed, the crisis improved the economics of switching to a heat pump. At the same time, overall affordability became worse as both fuel and electricity prices rose, and households who were already struggling to pay for fossil heating before the crisis cannot afford to pay for the switch.

Governments can help low-income households switch to clean heat by providing subsidies that are tailored towards those who can least afford it, ensuring that these households are first in line for deep renovations, transferring policy costs away from the most vulnerable (e.g., by shifting energy taxes away from clean heating resources), and promoting innovation to address energy equity challenges.

## Designing EU clean heat standards

This section reviews existing design models of clean heat standards to inform decision-makers in the EU on how these tools could complement existing and planned policies. Many clean heat standards are still at an early stage, so we draw parallels with similar established legislation in other sectors, including transport, energy efficiency and renewable energy.

Several clean heat standards are already operating, under development or being considered by decision-makers around the world. Table 2 below provides an overview of the examples we found, classified according to the identity of the obligated party and the type of clean heat interventions they target. An overview of these schemes and literature references can be found in Annex 2.

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<sup>31</sup> Sunderland & Gibb, 2022.

Table 2. Overview of clean heat standards

	Downstream interventions only	Upstream interventions only	Mix of downstream and upstream interventions
<b>Energy companies</b>	No example found	• France • Ireland*	• Colorado, U.S. • Vermont, U.S.* • Massachusetts, U.S.*
<b>Heating appliance manufacturers</b>	• UK*	No example found	No example found

\* Under development or consideration

## Clean heat standards on energy companies

Decision-makers can opt for putting the obligation on energy companies. The examples we have found can be classified into two groups. The first group focuses on the GHG content of the fuels delivered through replacing fossil fuels with renewable fuels (upstream interventions). The second group also permits the obligated party to meet the standard through actions taken at the customer level (downstream interventions), including the replacement of heating appliances and actions to lower heat demand.

### Obligations on energy companies limited to upstream interventions

In some clean heat standards, energy companies lower the GHG stemming from heating fuels. These schemes do not directly promote heat electrification or energy efficiency.

The first scheme we looked at is running in **France**. It puts an obligation on gas suppliers to file green certificates. Obligated parties can obtain certificates by directly injecting biogas into a gas network or by purchasing them from biogas producers. This scheme is fuel-specific, as it supports the injection of biomethane into the gas grid in line with the objectives of the French multiannual energy plan.

The second scheme is under development in **Ireland**. It is broader than the French scheme, both in terms of obligated parties (all heat fuel suppliers, not only gas) and eligible actions (all renewable heat, not only biomethane). If the heat obligation rate is 3%, a supplier providing 1,000 GWh of non-renewable energy would need to deliver at least 30 GWh of renewable energy or purchase credits from other suppliers.

### Similar tools in other policy areas

These clean heat obligations on energy companies are similar to **renewable portfolio standards (RPS)** in the electricity sector. An RPS, or a renewable electricity standard (RES), requires electricity suppliers to provide their customers with a minimum share of electricity from eligible renewable resources. They can trade renewable energy certificates or green certificates.

**Fuel standards**, in place in the transport sector, address the GHG content of fuels. Electricity is explicitly addressed in the two standards presented below:

- Under the proposed renewable transport fuel obligations in the EU Renewable Energy Directive, each Member State will have to set an obligation on fuel suppliers to ensure that the amount of renewable fuels and renewable electricity supplied to the transport sector leads to a GHG intensity reduction of at least 13% by 2030, compared to a baseline. This includes a trading mechanism.<sup>32</sup>
- In the U.S. states of California, Oregon and Washington, as well as in the Canadian province of British Columbia, the low-carbon fuel standard provides a declining carbon intensity benchmark for each year and assigns a score to each fuel based on its lifecycle GHG emissions. Every transport fuel provider must demonstrate that its fuel mix meets the standard for each annual compliance period, or that it purchased credits from other fuel providers.

## Obligations on energy companies open to both upstream and downstream interventions

A growing number of states in the United States have recently been developing clean heat standards which put an obligation on energy companies. Under these schemes, both upstream and downstream actions can be used to satisfy the clean heat obligation. The broader scope takes into account that the potential to decarbonise heating fuels is quite limited compared to the potential to decarbonise heat uses through electrification and energy efficiency.

In **Colorado**, the standard is already in place and gas distribution utilities should file their first clean heat plans in 2023-2024, demonstrating how they will achieve GHG reductions.

In **Vermont**, a legislative act was recommended by the state's Climate Council and approved by the legislature, but it was vetoed by the governor. It is still under active consideration. The legislation would put an obligation on the gas utility and on fossil fuel heat providers to acquire and retire a number of clean heat credits each year. These credits would stem from actions such as the delivery of low-emission heating fuels, energy efficiency and weatherisation measures, and the installation of electric or renewable heating systems.<sup>33</sup>

In **Massachusetts**, the Commission on Clean Heat, which advises the government, recommended the establishment of a clean heat standard and provided

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<sup>32</sup> Member States will have to establish a mechanism allowing the trading of credits between fuel suppliers and economic operators that supply renewable electricity to electric vehicles through public recharging stations.

<sup>33</sup> Many actors, including heating, ventilation and air-conditioning contractors, fuel dealers, electric utilities, housing authorities and weatherisation programmes providers, as well as the obligated parties, can earn and trade credits with obligated parties. Obligated parties do not need to establish that the measure was implemented solely as a result of the clean heat standard but they must demonstrate that the emissions reductions are real.

recommendations on its design. The scheme would also be based on a credit system and would entail a “strong preference towards pursuing electrification.”

### Similar tools in other policy areas

The clean heat credit system envisioned in the U.S. states of Vermont and Massachusetts makes these tools very similar to **energy efficiency obligation schemes (EEOs)**. EEOs require obligated parties to deliver a defined level of energy savings but leave it to them to find the best delivery routes for doing so, within a set of options. More than 25 U.S. states, 16 European countries and many other countries around the world have EEOs in place; together these cover nearly one-fifth of global energy use.<sup>34</sup>

Several EEOs allow trading between obligated parties (horizontal trading) or between obligated parties and third-party providers (vertical trading). In a few cases, the scheme includes a possibility for obligated parties and other actors such as energy services companies to trade white certificates through intermediaries and/or on spot markets. Obligated parties and third parties can generate these certificates by carrying out certified energy saving actions among energy end-users. The certificates guarantee that a specific amount of energy savings has been achieved. Many EEOs have clean heating systems as eligible measures alongside energy efficiency measures but do not include specific targets for their delivery.

Obligated parties can be vertically-integrated energy utilities in regulated electricity and gas markets, energy retailers or transmission and distribution system operators in unbundled markets where separate entities undertake the transmission, distribution and supply of energy. Obligated parties can also include transport and heating fuel suppliers, which is the case in many European EEOs. The choice of obligated parties among energy companies requires several things to be taken into account. These include in particular:

- The state of the energy services market: Putting the obligation on energy retailers may lead them to offer energy services, as they already have access to end-consumers. Putting the obligation on distribution system operators may lead to the expansion of an energy services market outside of energy companies.
- Costs: Putting the obligation on energy retailers can increase competition between them and help to reduce the cost of energy efficiency actions. Putting the obligation on regulated distributors eases the regulation of the cost pass-through and the monitoring of costs for end-consumers. Indeed, where the obligation is on regulated distribution companies, as is often the case in the United States, utilities recoup the costs of EEOs through distribution tariffs. By allowing parties to trade compliance certificates, a white certificate market can also provide price signals to the supply chain and policymakers on the ease or difficulty with which obligations will be met.

We are aware of interest in clean heat standards among legislators and environmental decision-makers in several other U.S. states, including **Maryland, Maine, Connecticut and New York**. Each of these inquiries is at present at an early stage, so it is not possible to describe their design.<sup>35</sup>

<sup>34</sup> International Energy Agency. (2021). *Energy Efficiency 2021*. <https://www.iea.org/reports/energy-efficiency-2021>

<sup>35</sup> Legislation developed by Governor Jay Inslee in the state of Washington and taken up by the legislature in 2021 would have established a state-wide clean heat standard to limit the expansion of the gas distribution system and promote use of electric equipment and clean fuel production and distribution. This proposal ran into opposition from gas utilities and other interests and has not been adopted, however. Under the proposal, gas utilities would have to take steps to ensure a "safe and equitable transition of the natural gas system" and submit a transition implementation plan every four years in order to reduce GHG emissions linked to gas sales. The legislation would have required utilities to evaluate strategies to achieve those reductions, including energy efficiency, electrification, strategic decommissioning of gas assets and blending renewable natural gas and hydrogen into the gas stream. Utilities would have to identify the combination of strategies with the lowest reasonable cost and achieve reductions in GHGs consistent with their proportional obligations under the state's climate objectives.



## Assessment in an EU context

Here we explore how clean heat standards for energy companies can complement the EU framework for heat decarbonisation.

- **Setting a trajectory for supply chains**

Clean heat standards for energy companies can set a trajectory for the clean heat supply chain, including by supporting the rollout of clean heat appliances such as heat pumps. This can boost the growth of supply chains, from manufacturing capacity to training installers, and decrease the direct and indirect costs related to this switch to clean heat.

The potential to decarbonise heating fuels at upstream level is quite limited compared to the potential to decarbonise heat through customer-level actions such as electrification and energy efficiency. Decision-makers could put the obligation on energy companies but limit the options to downstream measures. They could also extend eligibility to actions involving clean district heating networks.

- **Ensuring early replacement of existing fossil fuel heating equipment**

As long as fossil fuel boilers are still on the market, clean heat standards for energy companies can promote clean alternatives. They can also promote upgrades of heating systems before they break down, avoiding emergency purchases of fossil fuel boilers.

After new fossil fuel boilers are removed from the market, clean heat standards on energy companies can ensure that the replacement of existing heating equipment occurs at the pace needed to meet GHG reduction goals. In particular, while the vast majority of heating system replacements happen at the point of ‘distress’ (terminal breakdown), some building owners may seek to lengthen the lifetime of existing fossil-fuelled equipment through maintenance to avoid buying a new, potentially more expensive, appliance. Clean heat standards can ease the switch by supporting end-users.

- **Supporting low-income households**

In an obligation scheme for energy companies, consumers would ultimately bear the costs incurred by the companies in complying with the clean heat standard, passed on through energy bills. It is possible, however, to direct the benefits of the standards to low-income households. This can be achieved by setting a sub-target for energy companies to meet by supporting these households, as is the case with the French and Irish EEOs. The UK EEOs is entirely focused on low-income households.<sup>36</sup> The Vermont and Massachusetts clean heat proposals include specific requirements to deliver bill-reducing clean heat measures to lower-income households.

A clean heat standard for energy companies and the EU ETS schemes could complement each other. A clean heat standard could put an obligation on energy companies which might also be required to hold allowances to cover their

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<sup>36</sup> ENSMOV. (2022). *Energy Efficiency Policy for a Fit for 55 world – Policy recommendations for the implementation of the EED energy savings obligation*. <https://ensmov.eu/12-policy-recommendations-to-implement-an-eed-energy-savings-obligation-in-a-fit-for-55-world/>

emissions under the ETS. This is already the case for energy companies that are subject to both the ETS and EEOSs, and for those subject to the ETS and renewables obligations. These interactions can be synergistic and positive. For example, a clean heat standard would lead to clean heat actions and therefore reduce the price of EU ETS 2 allowances, and lower the total cost of the transition to end-use customers.<sup>37</sup> The decision to put in place a policy instrument dedicated to heat decarbonisation would recognise the inability of the EU ETS 2 price to drive action in the sector on its own, just as many EEOSs drive reductions in electricity consumption alongside the current EU ETS.

It is important to note that the EU ETS 2 does not fall under our definition of a clean heat standard. It covers more than just heating fuels, leaving some flexibility for different GHG reduction trajectories in the heating sector. It also does not require an investment in clean energy solutions. The reduction in energy demand among price-sensitive consumers resulting from an ETS, absent delivery of eligible clean heat fuels or measures, would not earn clean heat credits under a clean heat standard.

## Clean heat standards for heating appliance manufacturers

Decision-makers can opt to put the clean heat obligation on heating appliance manufacturers. The actions that manufacturers can take to comply with the standard are downstream actions only. This reflects the capacity of these manufacturers to influence the sales of new equipment, while they are further away from influencing the carbon content of the heat supply.

The only example of a clean heat standard for heating appliance manufacturers we know of is in the **United Kingdom**, where the government ran a public consultation and developed a design for a new policy instrument. The obligation would require heating appliance manufacturers to ensure that a minimum proportion of their overall UK heating appliance sales to end-consumers are low-carbon heat pump sales. Manufacturers who overachieve their target would be able to trade credits with other manufacturers. The UK also considered putting an obligation on heat suppliers but decided to further explore the manufacturer obligation.

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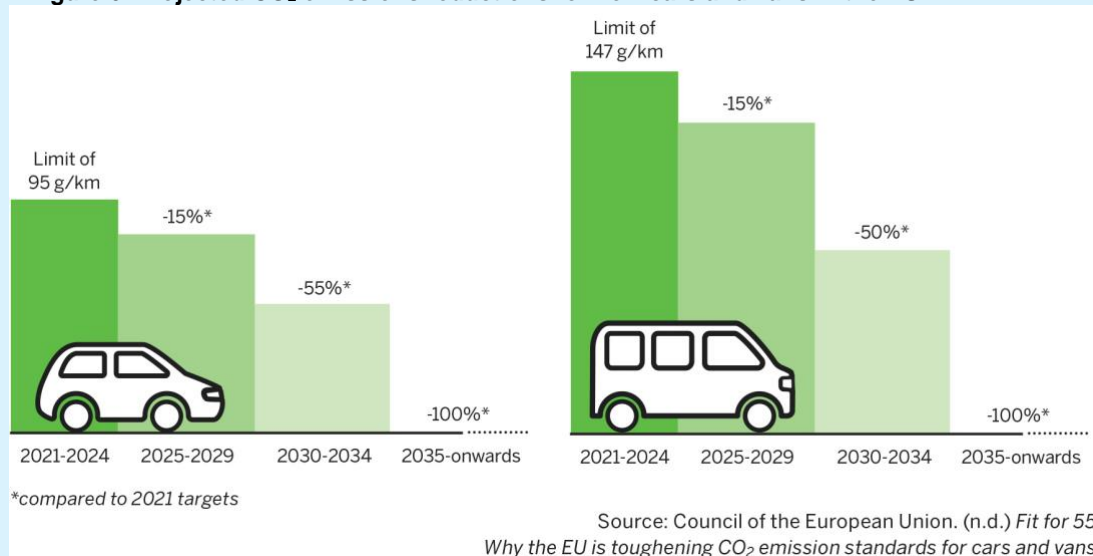
<sup>37</sup> Cowart, R., Bayer, E., Keay-Bright, S. & Lees, E. (2015). *Carbon caps and efficiency resources: Launching a "Virtuous Circle" for Europe*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/carbon-caps-and-efficiency-resources-launching-a-virtuous-circle-for-europe/>

### Similar tools in other policy areas

The manufacturer obligation is inspired by **obligations on vehicle manufacturers**.

- For example, the EU has set CO<sub>2</sub> emissions performance standards for new passenger cars and vans. This regulation sets fleet-wide CO<sub>2</sub> emission targets for each manufacturer applying from 2020, 2025, 2030 and 2035 as shown in Figure 6.<sup>38</sup> Manufacturers can group together and act jointly to meet their emissions target. The target applicable from 2035 onwards is 100%, meaning a de facto end to combustion engine sales by 2035.

**Figure 6. Projected CO<sub>2</sub> emissions reductions for new cars and vans in the EU**



- In California, sales of new zero-emission vehicles and plug-in hybrid electric vehicles must equal at least 35% in 2026, 68% in 2030, and 100% in 2035. This means a 2035 date for ending sales of new internal combustion engine passenger vehicles. Several other U.S. states are expected to follow the California model.

A similar example can be found in the EU regulation to control emissions from fluorinated greenhouse gases (F-gases), which places an **obligation on producers and importers of F-gases**. F-gases are manmade gases that are used in a range of industrial applications, including as substitutes for ozone-depleting substances. They are powerful GHGs, with a higher warming potential than CO<sub>2</sub>. Each producer and importer has a yearly quota which decreases over time. The quotas are set in CO<sub>2</sub> equivalent, meaning that they are not quotas for certain refrigerants but rather quotas for the overall GHG impact of the products that obligated parties place on the market each year. Trading is possible.

### Assessment in an EU context

Below we examine how clean heat standards for heating appliance manufacturers can complement the EU framework for heat decarbonisation.

- Setting a trajectory for supply chains**

Clean heat standards for heating appliance manufacturers provide targets for the sales of new heating equipment. Decision-makers can express these targets in different ways: average fleet emissions, percentage of sales taking place in a certain product category, and so on. These clean heat standards can promote the roll-out

<sup>38</sup> Council of the European Union. (2022). *Infographic – Fit for 55: why the EU is toughening CO<sub>2</sub> emission standards for cars and vans.* <https://www.consilium.europa.eu/en/infographics/fit-for-55-emissions-cars-and-vans/>

of heat pumps in line with EU targets and ease the application of an end date for the sale of fossil fuel boilers. In the heating sector, manufacturers have a privileged access to installers, meaning that the obligation could have an impact on a major supply chain constraint. This is why the UK government expects manufacturers to promote financing models for heat pumps and to provide training to installers. This tool would be quite new in the building sector, however, and there is uncertainty about the delivery routes for manufacturers to meet such an obligation.

Once fossil fuel boilers are no longer on the market, a clean heat standard for heating appliance manufacturers can still play a role in promoting certain technologies over others, if this is useful for meeting the EU's goals.

- **Ensuring early replacement of existing fossil fuel heating equipment**

Clean heat standards for heating appliance manufacturers would not typically accelerate the replacement rate of heating appliances. By lowering the costs associated with switching to a clean heat system, they can nevertheless improve the likelihood of households considering this change.

- **Supporting low-income households**

A clean heat standard for appliance manufacturers would not typically benefit low-income households specifically. The funding burden would largely be borne by customers who purchase a fossil fuel boiler, an impact which may have significant equity implications. To ensure low-income households can access clean technologies, decision-makers could introduce a clean heat standard for manufacturers together with a subsidy scheme for low-income households to help them deal with the potential issue of high upfront costs.

## Overview

Overall, clean heat standards can complement the EU policy framework by ensuring that end-users benefit from the achievement of a quantitative clean heat target. Depending on their design, these tools can introduce more certainty for the whole clean heat supply chain, while also raising acceptability for climate legislation and goals by supporting households to access clean heat options. A clean heat standard can be designed to deliver clean heat solutions particularly to low-income households, helping to overcome barriers to investments and ensuring greater equity in the context of the broader heat decarbonisation framework. Table 3 highlights how different models of clean heat standards would complement the EU clean heat framework. The following section provides recommendations on designing clean heat standards.

**Table 3. Overview of clean heat standards design options in an EU context**

	Set a trajectory for supply chains	Replace existing heating equipment	Support low-income households
<b>Obligation on energy companies</b>	Can support upstream and/or downstream actions	Can support early replacement of heating appliances	Can target low-income households
<b>Obligation on heating appliance manufacturers</b>	Limited to sales of new appliances	Not directly supporting early replacement	Requires additional policies

## Recommendations

We recommend that decision-makers evaluate the impact of setting a quantitative target for market actors in the heating sector to accelerate the replacement of fossil fuel-based space heating systems. For example, the European Commission could consider this provision as part of its efforts to channel investments to clean tech strategic projects in the announced ‘Net-Zero Industry Act’.<sup>39</sup> Governments from individual Member States can roll out clean heat standards at national level to reach their climate and renewable heat targets while easing the impact of carbon prices.

If they opt to set such a policy, it is important for decision-makers to consider the following recommendations, with a view to putting the heating sector in line with climate goals, reducing the exposure of households and companies to increases in energy prices, and improving access to clean heating for all.

**Figure 7. Recommendations for designing a clean heat standard**

Set a trajectory for heat decarbonisation, facilitating an end date for the sale of fossil fuel boilers.



Support the just energy transition.



Create synergies with a suite of clean heat policies.



Ensure that the clean heat solutions promoted by the policy do not create lock-ins.



Build on existing policies, including energy efficiency obligations, if relevant in the national context.

<sup>39</sup> European Commission. (2023). *The Green Deal Industrial Plan: putting Europe's net-zero industry in the lead*. [Press release]. [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_510](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_510)

Decision-makers setting up a clean heat standard can design the tool to:

- **Set a trajectory for heat decarbonisation, facilitating an end date for the sale of fossil fuel boilers.**

By complementing EU carbon pricing policies, clean heat standards can help customers make the switch to a decarbonised heating solution ahead of the date by which fossil fuel options are removed from the market. In doing so, clean heat standards can prepare the supply chain for a ramp-up in decarbonised solutions. Clean heat standards can play a role after this date, supporting the early replacement of existing fossil heating appliances and promoting technologies that bring benefits to the energy system. Clean heat standards can also be designed to develop clean district heating networks.

- **Support the just energy transition.**

Considering equity requires an evaluation through a social lens of those who fund the programme and those who benefit from it. In other words, how will the costs of meeting the obligation trickle down to customers, how will these costs be distributed, and is this appropriate in the national context? To achieve an equitable outcome, decision-makers can shield low-income households from the burden of bearing the costs of the programme directly or indirectly, while exposing them most prominently to its benefits. This will ensure that the policy actively supports the objective of a just energy transition.

In terms of the funding burden, clean heat standards for energy companies tend to transfer the costs directly to energy bills, while ensuring that benefits are spread to all participants through reduced system costs. These schemes, however, disproportionately affect low-income households with an inefficient home and heating with fossil fuels, as they are the least able to compensate for increased policy costs on their energy bills. Energy companies may have an incentive to pursue customers with more access to capital. Decision-makers can deal with this issue by setting a sub-target for low-income households.<sup>40</sup> Vermont opted for this design feature, which other U.S. states are also considering. This option is only possible if the scheme is open to actions taking place at the end-user level. An obligation to increase renewable sources in heating fuels cannot benefit one group of users over other groups of users. Decision-makers can also shield energy bill payers from the costs of an obligation on energy companies by financing the activities from the general budget.

Clean heat standards for heating appliance manufacturers also cross-subsidise clean heating. Those who will purchase fossil fuel technologies or technologies not supported by the clean heat standards are likely to pay an indirect cost for the obligation, as appliance manufacturers will be looking to promote sales of clean options. To ensure low-income households can access clean technologies, decision-makers could introduce a clean heat standard for manufacturers together with

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<sup>40</sup> Decision-makers can include a sub-target for preferred options. They can also promote certain types of actions through uplifts providing a higher value per clean heat action achieved in certain households, geographical areas or from certain actions. Sub-targets or ringfences are likely to be more appropriate than uplifts to secure action among low-income households. ENSMOV & SocialWatt. (2021). *The Energy Efficiency Directive energy savings obligation and energy poverty alleviation*. <https://ensmov.eu/policy-guide-the-lead-energy-savings-obligation-and-energy-poverty-alleviation/>



subsidy schemes designed to help these households deal with the potential issue of high upfront costs.

- **Create synergies with a suite of clean heat policies.**

Clean heat standards and other policies can reinforce each other and deliver heat decarbonisation more effectively.

Consumer protection and quality control measures can help ensure that obligated parties comply with requirements when installing measures. Information policies can provide a good understanding of what a full decarbonisation means for each individual building and help avoid sub-optimal investments. For heating, this means ensuring that the heating system is sized to the building, taking into account the potential envelope improvements that should be made.<sup>41</sup> Heat planning can also provide the right information to building owners.<sup>42</sup>

Decision-makers could decide to combine clean heat standards with subsidies, as is the case with some EEOs which work hand-in-hand with subsidy schemes.

- **Ensure that the clean heat solutions promoted by the policy do not create lock-ins.**

A clean heat standard can provide sufficient flexibility for market actors to respond to the obligation while reflecting the need to manage the transition in the heating sector. Certain solutions may make sense at some levels but are not optimal in the long run or from a system perspective.

For this reason, decision-makers can decide to exclude specific measures from the list of eligible actions under the clean heat standard. For example, Vermont and Massachusetts would prohibit giving clean heat credits for simply substituting one fossil fuel use for another, even if the new use would have lower emissions. The goal of this rule is to avoid fossil fuel 'lock-in.' Indeed, although replacing a less efficient fossil fuel boiler with a more efficient one can bring some GHG savings, this might not be the best use of a household's money if the equipment will need to be changed again before the end of its lifetime when fossil fuel equipment is phased out. Whether lower-GHG fuels should be credited under a clean heat standard is also a matter of programme design. Some programmes would permit the use of sustainably sourced biofuels and gases to earn credits using existing infrastructure because they would reduce emissions during the transition. However, new heating systems designed to burn low-carbon gases are likely to outlive the life of the gas network (which may need to be decommissioned) and will divert financial resources away from where they are most needed.<sup>43</sup>

Decision-makers may opt for a more flexible design if other policy tools are in place to avoid suboptimal investments. They can also ensure that the nature of the target,

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<sup>41</sup> This is already applied in some renewable heat subsidy schemes. See for example Ofgem. (n.d.). *Domestic Renewable Heat Incentive (Domestic RHI) – Applicants*. <https://www.ofgem.gov.uk/environmental-and-social-schemes/domestic-renewable-heat-incentive-domestic-rhi/domestic-renewable-heat-incentive-domestic-rhi-applicants>

<sup>42</sup> For example, the Netherlands is pioneering a district-oriented approach through heat zoning plans. The Netherlands Ministry of Economic Affairs and Climate Policy. (2019). *Integrated National Energy and Climate Plan. 2021-2030*. [https://energy.ec.europa.eu/system/files/2020-03/nl\\_final\\_necp\\_main\\_en\\_0.pdf](https://energy.ec.europa.eu/system/files/2020-03/nl_final_necp_main_en_0.pdf)

<sup>43</sup> Anderson et al., 2022; Rosenow, J. (2022). Is heating homes with hydrogen all but a pipe dream? An evidence review. *Joule*. 6. <https://doi.org/10.1016/j.joule.2022.08.015>

as well as the unit used to measure progress, prioritise certain heating pathways over others by allowing multiple options to compete in meeting a common standard. For example, Vermont opted for lifecycle GHG emissions to avoid the problem of ‘exporting’ emissions or overlooking impacts from biofuels. Decision-makers can include a sub-target for preferred options, or promote certain types of actions through uplifts which provide them with a higher value.

- **Build on existing policies, including energy efficiency obligations, if relevant in the national context.**

Countries which already have an EEOS in place can consider whether they can use this scheme to achieve clean heat objectives. This is particularly relevant in a European context, where EEOSs are commonly used to deliver final energy savings. The UK introduced its first EEOS in 1994. Italy’s scheme began in 2001 and France’s in 2006. As of 2022, encouraged by the Energy Efficiency Directive (EED)’s energy saving obligation requiring Member States to make end-use energy savings through national energy efficiency policy measures, 16 countries had EEOSs, with others developing plans.

In many of these EEOSs, heat pump installations are eligible actions, competing with other ways of saving energy. EEOSs would be expected to deliver at least some, if not many, heat pumps during the current EED energy savings obligation period (2021-2030). This is because the plan for a revised directive foresees that the obligation would become more ambitious from 2024 onwards, and energy savings from fossil fuel combustion technologies like fossil fuel boilers would become ineligible. In addition, replacing a fossil fuel-based boiler with a heat pump creates substantial eligible energy savings under the EED.<sup>44</sup>

Decision-makers could further boost the adoption of end-user clean heat solutions under EEOSs, as illustrated in the box below. They could also opt to set a dedicated EEOS sub-target for the buildings sector, for space heating energy savings, for heating system replacements, or for any of these types of interventions among low-income households.

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<sup>44</sup> Switching from a fossil fuel boiler to a heat pump generates around 15 times as much in savings per year as replacing it with a more efficient fossil fuel boiler, as ambient heat is not counted as final energy under the EED. For more information, see ENSMOV, 2022.

### Promoting clean heat solutions in EEOs

EEO design features affect the likelihood of obligated parties choosing to focus effort on heat pump installations. In particular:

- **Reference technology used in savings calculation:** If persuading a household or business to switch from a fossil heating system to a heat pump, savings can be calculated with reference to the likely fossil fuel boiler that would have been installed without the switch.
- **Lifetimes:** The length of time over which the savings can be counted is also important. Counting only first-year savings underestimates the true impact of heat pump installations and advantages actions with short lifetimes, such as behavioural interventions. Rewarding long-term actions such as building renovations or heat pump installations for their full lifetime increases their chance of implementation.
- **Uplifts:** Heat pumps could be privileged in EEOs by providing obligated parties with incentives (uplifts) for their installation, for example by allocating them a higher score per kWh saved. In the French EEO, the 'coups de pouce' system provides additional white certificates (which must be retired by obligated parties to comply with their obligations) for undertaking specific actions that help to meet broader environmental and social objectives.<sup>45</sup>
- **Sub-targets:** If decision-makers need more certainty over the delivery of heat pumps or clean heating technologies more generally, they can set a sub-target within the overall EEO, e.g., that X% of the obligation must be met through clean heating technology installations. This would essentially create a clean heat standard within an EEO.

## Conclusion

A meaningful quantitative target for clean heat is currently missing in the EU policy framework, and clean heat standards could fill this gap. The design of these tools is flexible and can take into account national priorities and social objectives. Clean heat standards would complement carbon pricing schemes and lower the consumer cost of transforming the heating sector. As part of a policy framework for buildings sector decarbonisation, clean heat standards would also complement the coming bans on new fossil fuel boilers. By delivering a clear trajectory for market transformation, they would add credibility to any fossil fuel boiler bans and help raise their acceptance.

This report provides initial recommendations related to these policy tools and outlines the need for further research to assess their effectiveness on the ground. Because many of these schemes are new or not yet implemented, there is little information available on their performance. More research is needed to explore the detailed design features of clean heat standards.<sup>46</sup>

<sup>45</sup> French government. (2022). *Décret n° 2022-1368 du 27 octobre 2022 portant augmentation des obligations d'économies d'énergie dans le cadre du dispositif des certificats d'économies d'énergie* [Decree No. 2022-1368 of 27 October 2022 increasing energy savings obligations under the energy savings certificate system]. <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000046496948>

<sup>46</sup> For more information about the different design features of a clean heat standard: Cowart, R., & Neme, C. (2021). *The Clean Heat Standard*. <https://www.raonline.org/knowledge-center/the-clean-heat-standard>; Cowart, R., Seidman, N., & LeBel, M. (2022). *A Clean Heat Standard for Massachusetts*. <https://www.raonline.org/knowledge-center/clean-heat-standard-massachusetts>

# Annexes

## Annex 1 – The EU heat decarbonisation policy framework.

*Citations can be found on the following page.*



Climate  
legislation

- The EU emissions trading system (EU ETS) puts an emission cap on several sectors, including electricity-based heating and large district heating plants.<sup>47</sup>
- The EU ETS for buildings and road transport and fuels for additional sectors puts an emission cap on other sectors, including fuels supplied to buildings.<sup>48</sup>
- National climate targets under the Effort Sharing Regulation put the responsibility on Member States to reduce GHG emissions from a number of sectors, including fuels for heating.<sup>49</sup>



Renewable  
and  
efficiency  
directives

- The proposals for a revised Renewable Energy Directive (RED) suggests that Member States increase the share of renewable energy in heating and cooling each year.<sup>50</sup> The methodology, however, favours inefficient technologies such as biomass stoves.<sup>51</sup> The RED proposals also include a new indicative EU target of renewables in buildings by 2030 and an increased indicative target for energy from renewable sources and from waste heat and cold in district heating.
- The Energy Efficiency Directive (EED) requires Member States to achieve a defined amount of energy savings from national policy measures. These savings can stem from installing more efficient heating systems.<sup>52</sup>



Pricing  
measures

- The ETS for heating and transport fuels was created to ensure a level playing field with electricity-based heating and transport.
- The reform of the Energy Taxation Directive proposed by the Commission would introduce tax rates based on the energy content and environmental performance of the fuels and electricity.<sup>53</sup>
- Some EU Member States, like Denmark, Germany and the Netherlands, have shifted taxes and levies from electricity to gas to reshape market economics towards decarbonised heating options.<sup>54</sup> The promotion of time-of-use and 'smart' electricity tariffs can also improve the economics for running a heat pump.<sup>55</sup>



Supportive  
measures

- The EU does not mandate the introduction of policy measures promoting clean heat. Some Member States have nevertheless a set of supportive policies in place, including direct financial support (grants and subsidies), financial instruments (like green mortgages), and policies addressing non-financial barriers (information campaigns, supply chain trainings, and so on).



Appliance  
standards  
and bans

- A few Member States have adopted appliance standards and bans that set a backstop for the use of fossil fuel heating equipment or fuels.
- The Commission proposed rolling out a minimum energy performance standards directive which would require existing buildings to reach a given performance level at a certain date.<sup>56</sup> The standards currently discussed in the Energy Performance of Buildings do not exclude the use of fossil fuel heat.
- The Commission is considering a de facto ban of heating appliances running on fossil fuel through the revision of ecodesign requirements from 2029 onwards.<sup>57</sup>

47. European Commission. (n.d). *EU Emissions Trading System (EU ETS)*. [https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets\\_en](https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en)
48. Council of the EU. (18 December 2022). *'Fit for 55': Council and Parliament reach provisional deal on EU emissions trading system and the Social Climate Fund*. [Press release] <https://www.consilium.europa.eu/en/press/press-releases/2022/12/18/fit-for-55-council-and-parliament-reach-provisional-deal-on-eu-emissions-trading-system-and-the-social-climate-fund>
49. Council of the EU. (8 November 2022). *'Fit for 55': EU strengthens emission reduction targets for member states*. [Press release] <https://www.consilium.europa.eu/en/press/press-releases/2022/11/08/fit-for-55-eu-strengthens-emission-reduction-targets-for-member-states/>
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## Annex 2 – Case studies

	Biogas certificate scheme, France	Renewable heat obligation, Ireland	Clean heat targets, Colorado, U.S.	Clean heat standard, Vermont, U.S.	Clean heat standard, Massachusetts, U.S.	Market-based mechanism for low-carbon heat, UK
<b>Status</b>	Implemented	Announced	Implemented	Pending	Under development	Pending
<b>Obligated parties</b>	Gas suppliers	Suppliers of heating fuels (including oil, liquefied petroleum gas, gas, coal and peat)	Gas distribution utilities	Gas utility and fossil fuel heat providers	Suppliers of energy to building heating systems (including utilities, wholesale liquid fuel and propane suppliers, and retailers)	Heating appliance manufacturers
<b>Obligation</b>	File green certificates, obtained by injecting biogas into a gas network or purchased from biogas producers	Achieve a heat obligation rate	File clean heat plans with Colorado's Public Utilities Commission demonstrating GHG reductions by 2025 (4%) and 2030 (22%), compared to a 2015 baseline	Acquire and retire credits from actions that reduce GHG in the thermal sector, including low-emission heating fuels, energy efficiency, weatherisation, and electric or renewable heating systems	Acquire and retire credits from actions reducing GHG, with "a strong preference" towards electrification, including weatherisation, energy efficiency, and energy-efficient new construction	Increased proportion of overall heating appliance sales must be low-carbon heat pumps
<b>Unit of measurement</b>	MWh	Ratio of renewable to non-renewable heat	GHG reductions	Lifecycle GHG reductions	Lifecycle GHG reductions	Ratio of heat pumps to fossil fuel appliances sales
<b>Equity</b>	No particular provision	No particular provision foreseen, but government notes that it will assess the impacts further	Prioritise investments ensuring benefits to disproportionately impacted and income-qualified customers	> 16% of total reductions must come from low-income customers and > 16% from moderate-income customers	Specified percentage of credits generated in priority populations, to be defined	No particular provision foreseen; need strong consumer protection safeguards and standards



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